NATURAL SCIENCE AND THE CLASSICAL SYSTEM IN EDUCATION

SIR RAY LANKESTER

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ESSAYS NEW AND OLD

EDITED FOR THE
COMMITTEE ON THE NEGLECT OF SCIENCE
BY
SIR RAY LANKESTER, K.C.B., F.R.S.

"C'est un bel et grand agencement sans doute que le grec et le latin, mais on l'achète trop cher."—MONTAIGNE, 1580.

"Not slow reform, but swift revolution is needed in our schools."—IMMANUEL KANT, 1774.

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PREFACE

THE Committee on the Neglect of Science desire to acknowledge their indebtedness to Messrs. Macmillan for permission to reprint from the book *Essays on a Liberal Education*, published by them in 1867 and now out of print, the Essays forming Chapters II, III, IV, and V of the present collection. They are indebted to the author and to the editor of the *English Review* for similar permission in regard to the essay by the Master of Balliol, which forms Chapter I. Their thanks are due to Mr. H. G. Wells for Chapter VI, which appeared in the *Fortnightly Review* last year, and for Chapter VII, which is a revised report of an address given by him to the British Guild of Science. They desire to express their thanks to Mr. F. W. Sanderson, the Head Master of Oundle School, for Chapter VIII, a hitherto unpublished essay, and to Sir Ray Lankester for Chapter IX.

The following brief biographical information with regard to four of the authors who are no longer with us, will be welcome to many readers, though not a few amongst us, in early days, knew them personally and valued their friendship.

1. CHARLES STUART PARKER was born in 1829, and educated at Eton and Oxford. He was a Fellow of University College from 1854 to 1867, and Examiner in the Final Classical School 1859–1868. He took an active part in politics, and advocated the liberal reform of the University and the recognition of science and modern languages and history in the curriculum. He was M.P. in 1868–1874 and again in 1872–1892. He was an active member of the Public Schools Commission 1868–1874, and

urged that the curriculum should be modernized. He died in 1910.

2. Edward Ernest Bowen was born in 1836 and died in 1901. He was educated at King's College, London, and Trinity College, Cambridge, where he became Fellow in 1859. He was a Master at Marlborough, and then at Harrow until his death. In 1869 he became the head of the modern side at Harrow, and was widely known as a brilliant and versatile teacher. He was the author of the Harrow School Song, "Forty Years On."

3. Lord Houghton (Richard Monckton Milnes, first Baron Houghton) was born in London in 1809, the only son of Robert Pemberton Milnes, of Fryston Hall, near Wakefield. He was educated at Hundhill Hall School, near Doncaster, and then privately. In 1827 he entered as a Fellow Commoner at Trinity College, Cambridge, where he was intimate with Tennyson, Hallam, Thackeray, and other promising men of his time. He left Cambridge in 1831 and travelled in Germany, Italy and Greece. He became Conservative M.P. for Pontefract in 1837, and married in 1851 the Hon. Annabel Crewe. The present Marquis of Crewe is his son. He published in younger days three volumes of verse. His poems excited public interest, and several were set to music. In 1848 he published *The Life and Letters of Keats*. In 1869 he represented the Royal Geographical Society at the opening of the Suez Canal, was President of the Social Science Congress in 1873, and in 1875 visited Canada and the United States, where he met Longfellow, Emerson and Lowell. In 1882 he succeeded Carlyle as President of the London Library. He died in 1885 at Vichy. Monckton Milnes was a man who abounded in friendliness and had wide sympathies. He was

the friend of many literary men, and was instrumental in securing to Swinburne the recognition which he early received.

4. WILLIAM JOHNSON—who took in later life the name "Cory"—was born in 1823, and educated at Eton and King's College, Cambridge. He was the most brilliant Eton tutor of his day. Among his pupils were the present Sir Frederick Pollock and Lord Rosebery. He was a poet of some distinction, and published in 1858 a volume entitled *Ionica*. He died in 1892, some years after relinquishing his work at Eton.

CONTENTS

CHAPTER I

NATURAL SCIENCE IN EDUCATION

BY THE MASTER OF BALLIOL

The Significance of Natural Science.—If there be one lesson more than another which the War is going to teach us, it is the lesson as to the future place of Natural Science in our education. It is true that there are still military authorities coming forward to say that we do not want science in the education of officers. But the military authorities have exhausted their power of surprising us; and, after all, some rational voices are beginning to be heard even in military circles. Science is coming to be recognized as part of the necessary equipment for modern life. The world is more and more coming to turn on exact knowledge, and science is simply exact knowledge applied to concrete things. As Bacon said, we can only command Nature by obeying her laws. These laws are the rules of the universe in which we live.

A training in science means not only the apprehension of one or other branch of these rules, but an attitude of mind which believes there are such rules and which faces new facts in this light. No subject gives just this kind of training so well as science gives it; no other subject punishes so immediately any lack in intellectual truthfulness. It is, of course, a truism to say that every subject can

be taught scientifically, but no other subject rests so absolutely on the one sole method of cogent proof, the experimental method. That is how one experiment in chemistry is conclusive for all identical cases; if water can once be analysed into oxygen and hydrogen and these once recombined into water, the one analysis and one synthesis are cogent and final. Thus when a Cabinet Minister suggests that it was no use stopping the import of cotton for explosives because wool could be substituted for cotton, he simply labels himself as ignorant of the very meaning of scientific evidence. Nor is the case bettered when a colleague pleads that he did not know that glycerine could be got from lard, or that all and any steel was not equally good for bullet-proof helmets. It is not mere ignorance but that deeper ignorance which does not know when it is ignorant—what Plato calls "the lie in the the soul."

The first educational result of science is to create a sense of what science is, what the laws of the universe mean, and how powerless against them is even the best Parliamentary debating. A second educational value of science is the new meaning and interest it gives to everything about us, from the processes of industry to the aspects of Nature in a country walk. Under the guidance of a chemist and physicist, the working of a cotton mill or of an electrical furnace becomes fascinating; in the company of a geologist or a biologist, a landscape or a field becomes a revelation. We realize the complexity of things and the mystery of life; the problems of health in the individual or in the social organism challenge us. We can never again feel irresponsible for our own bodies, or for the well-being of children; or be callous to all

that is implied in the death of 100,000 infants in their first year, or the toll of life taken by preventible diseases. I have seen an audience of New York business men attending spell-bound to the drama of sleeping sickness, the struggle between the phagocytes and the invading microbes, as depicted in a series of moving pictures on the cinema film.

Then there is the further and deeper influence which can only be justly expressed by the term "spiritual"; that effect of mingled awe and exultation which is produced when science opens out to us some profound vista of the universe, such as when we first look through a big telescope and Saturn amid his rings swims into our sight, or when first we look through the spectroscope with some dawning sense of what message from infinite space those bright colours and dark lines are sending to us, or when the microscope affords us a view of the tumult of hurrying life in the blood corpuscles of a living creature. The bare demonstration of the activity of radium, the sight of that streaming rush of particles with its revelation of the infinite subdivision of matter and its suggestion of a whole new horizon of physical research—a stupendous new field of science—may be so made as to awaken, as by an electric shock, the faculties of wonder and reverence. It is in such moments of insight that the minds of the young, their very souls, make an upward leap, and such moments can be produced in every mind, however technically unequipped.

Then there is another aspect of science in education that will be admitted by everyone, and that is the treatment of some great discovery on its biographical side, utilizing the life-story of great men such as Dalton, Davy, Faraday. The work of Pasteur of

itself falls into a dramatic form of surpassing interest, and that, too, an intensely human interest. Or the whole of the successive discoveries on which modern electric theory is built may be themselves shown in a narrative form which has all the attraction of following up a problem from its simplest to its advanced stage, while attaching to each step the human personality of its discoverer, and showing the unity and continuity of the effort of mankind, the debt of the present to the past.

All these methods imply good teachers. But already there are such teachers working on such methods with notable success; and the rank and file of teachers have only to adopt them. This fact answers the difficulty about time, and the overloading of the curriculum. In the hands of a good teacher each one of these educational effects of science may be set going in a very brief time. It does not take much time to see an electric furnace tapped or to hear dynamite exploded, but the mental effect is as vivid as it is instantaneous, and can be made ineffaceable by being explained—following up the fact with the how and the why.

It is the new mental attitude created that is the all-important thing. Indeed, if it were not so, the demands of some of the scientific reformers would be absurd, as when they propose to add to the ordinary curriculum "a knowledge of the ascertained facts and principles of mechanics, chemistry, physics, biology, geography, and geology." As a matter of fact, such knowledge in a sufficient outline can by proper methods of teaching be got into the ordinary school course of ordinary boys and girls in four years of a methodical programme, say from thirteen

years to seventeen. In the judgment of well-known practical teachers such a programme could be carried out in a four years' allowance of four hours a week. If this means some lightening of the present overloaded curriculum, so much the better; for the best classical teachers are agreed that there has been a great deal of undue specialization and wasted drill in grammar and composition. There is certainly something the matter when Homer or Virgil are made loathsome memories to boys, just as there was in an old edition of Shakespeare which reduced even "Macbeth" and "The Tempest" to pedantic sawdust. Preparation for such a programme can be begun even earlier than thirteen in the primary schools by the various forms of "nature study," which children love and are so well suited to their instincts of curiosity, of outdoor activity, and the keeping of "pets" and collections. In this stage, too, can be trained and developed what is somewhat grandiosely called the "heuristic" method, the method of self-teaching by successive trials and failures, the method which appends to every piece of theory its appropriate result. "Practical work" is nowadays recognized as essential.

As human intercourse has to be carried on by speech and writing, these must be part of the training from the first. On the other hand, "there exists a certain body of scientific knowledge or ideas with which a man or woman must be to some extent familiar, if he or she is to be regarded as educated." There are some elementary facts so closely bound up with our daily life that all must know them. There are some ideas, such as the conservation of energy, which are the very foundation of the material world, and which by concrete examples can be made familiar from even early years. There

are also methods by which the quantitative basis of things and the conception of cause and effect can be made clear. All this can be done by selection from the great feast which lies before us for choice. Thus in chemistry, instead of trying to cover all the elements, a study may be made (say) of carbon, oxygen, hydrogen. In physics, a study of some characteristic solids, liquids, and gases. In botany, the seed, the leaf, the root of particular plants. All this in the first year. In the second year the pupil can be introduced to the subjects of heat, electricity, zoology. In the third year, organic chemistry, physiology, advanced botany. Who will say that each of these subjects is not educational, and cannot each of them be made profoundly interesting in the hands of a good teacher? This would do much to cure what is one of the great defects of English training, namely, the lack of respect for knowledge as such; a defect responsible for our English contempt of "experts," our impatience of "theory," and ignorant contrast of it with "practice," and our resultant habit of expecting to "muddle through somehow," a habit which this war should surely do something to cure when we count up the lives it has cost us.

Nor can any educationist fail to be conscious of the unduly bookish character of our education, which requires to be balanced by much more direct contact with material things and the use of observation and imagination as against reading and memorizing. This memory work and the absence of independent effort by the pupil, along with the mechanical methods of the teaching, were what vitiated the former attempts to introduce science into the schools. All boys are full of natural curiosity; they all want to know how

the machine works, what made the explosion, why two liquids turn into a solid, and so on. To kill this healthy appetite requires quite a long course of feeding on husks; but this has too often been the course adopted on the "science side" in Public Schools. Among these there were some where the science was allotted one hour a week, with no practical work; many where the science work did not count towards determining the order in the class; others where on the whole "modern side" there was no science work at all. All promising boys were ear-marked as classical specialists. What wonder when there were in a recent year at Oxford 103 scholarships given for classics, and only 27 for all the branches of natural science? The Universities would say, What is the good of offering more scholarships for science, when it is badly taught at the schools, and when trained graduates in science find no posts open to them in England, and have to go to America and the Colonies? It is all a vicious circle, depending on the ignorance and apathy of public opinion in the matter; an illustration of which is the fact that in one great university, half the "pass" students in the Faculty of Arts omit mathematics and science altogether. We may perhaps lay down that we ought to add some science to the existing language, literature, and mathematics required in every university entrance examination. This would be equivalent to saying that an educated man must have had some linguistic training, some training of the imagination by the literature or history of his own country, some training in the ideas and methods of science, besides some practical drill in arithmetic and geometry as the universal instruments of exact thinking. None of these need mean "smattering."

That danger can be avoided by the rule, "know a little, but know it well." In fact, good grounding is the very opposite to superficiality and dispersion.

But university entrance examinations will not achieve much; the minimum demanded is apt to be treated as a maximum, and it gives no guarantee that the student will be introduced to those other subjects which are needed as well as science: such as the elements of citizenship, the recent history of his own country and its political institutions, the economic and social conditions and problems of the time. Moreover, the university students will always be only a fraction of the whole population. What we have to do is (1) to elevate the standard of the teachers, enlarge their outfit, and improve their methods; and (2), above all, to educate the public into a new attitude as to what education means, what it must contain, and how it is vital to the community. It all comes back to this, the education of the public on the subject of education; hence the need of a new national appeal. Nothing less than a veritable crusade will achieve this. We must use aright the new lessons taught us by this war—if we are ever going to be taught by experience and to use aright the new spirit generated by the war. A spirit of national self-criticism and of determination to enter on a real reconstruction is necessary. Putting it on the lowest ground, there is no way to pay for the war but by having a more efficient people; that is, a people more instructed and educated. The whole capital sum required for this would amount to a few days' cost of war. It is little use tinkering, and no use at all to go on the old scale of doling out patchwork reforms. Here lies the chief immediate danger.

Science and Literary Studies.—In the supposed dis-

cordance between Science and Literature there have been exhibited some strange examples of the scientific "temper," of scientific "judgment," and even of scientific "accuracy" of statement. But we must not allow ourselves to be repelled into reaction by a few hot-headed champions. Nor must we yield too much to the claim of an inherent opposition between the two types of mind, the scientific and the literary. It is true that real scientific genius, like that of a Newton, a Faraday, or a Darwin, is as priceless in value as it is rare; but such genius will emerge if we only get rid of our stupid social barriers and get somewhat nearer to the ideal of "an open career for talent." Again, we must not let it all turn on the marks allotted to different subjects in the Civil Service Examinations, or the balance between different subjects in University Scholarships and Entrance Examinations. No! What we need is more than that: it is a profound change in the national attitude of mind. We need a general recognition that Literature and History can be made an intellectual training, and Natural Science be taught in a philosophic way, and that each is as necessary a part of complete education as the other. This reconciliation between the two is the recent tendency in Germany itself; and no one who knows will say that we have nothing to learn from German methods. We might as well say we had nothing to learn from German artillery. It is the end to which and the spirit in which those methods have been applied that we feel to be detestable.

Science in Industry.—The Germans have boasted of their superior application of science to industry. Men well qualified to judge say this is another piece of German bluster, and that there is more original

first-class scientific invention in England, but that, owing partly to their huge syndicated industries and partly to our manufacturers' easy-going or even ignorant ways the world has taken the Germans at their own valuation. Certainly our manufacturers will have to wake up to the place of science in modern industries, and not "pooh-pooh" an investigation into the constitution of rubber as "academic," or avow that they do not believe in research which does not "produce its results within a year." They will have to combine among themselves to provide research on an ample scale, as has been already agreed upon in the Potteries. The State has also already, through the Committee for Scientific and Industrial Research, given a lead towards the formation of Institutions for Research in different localities, such institutions to be supported both from State funds and from associations of manufacturers, and to deal with all the chief national industries—glass, pottery, metals, engineering, mining, textiles, rubber, etc. This excellent scheme requires to be backed up by a system of research scholarships and research fellowships to provide the students, and by statutory powers which will bring all firms into line, so as to enable an advance on the whole front at once. Here again all depends on an instructed and convinced public opinion to provide the money, to authorize the powers, and to create the necessary atmosphere.

Education in Modern Languages.—According to Disraeli, the modern Englishman comes nearest among all nationalities to the ancient Greek, for he lives most of his time in the open air and speaks no language but his own. This ignorance of modern

languages has certainly been one of the greatest gaps in English education. It is the result of a combination of causes—the insularity of our geographical position, our past history and our unique institutions, the national shyness and self-consciousness backed up by a deep national self-sufficiency, and even arrogance, the ingrained belief that foreigners are at best comic characters who gesticulate, embrace, shed tears, and don't wash. Yet there are Public Schools in which a capable French master, aided by good "Pathéphone" records, has succeeded in making the boys take a pride in acquiring a correct French accent and enjoying a scene from Molière in the exquisite rendering of the Comédie Française. Where this can be backed up by a few weeks' visit to France, the results are marvellously good. Can this experience be extended to the ordinary schools of the people? The answer is, Why not? It is so in other countries, such as Germany, and even Egypt, where practically all the scholars learn to speak English quite passably. We know also from Wales and the Highlands how great is the value of a bi-lingual training; and this is almost effortless in childhood, when the brain is as pliant as the tongue to new words and sounds. To be introduced to the foreign point of view would be invaluable in shaking some of our most bigoted English prejudices. It would make possible that personal intercommunion between ourselves and our Continental neighbours which has hitherto been the monopoly of the well-to-do classes, but is going to be a common privilege of groups of working-class students after the war, and to act in a quiet but effective way to build up a basis for international understanding for the future peace of the world. Whilst that certainly depends on our

being ready to fight in its defence, it also depends among democratic communities upon the amount of active international sympathy and the appreciation by each people of the other's inherent desire for peace.

Even as to the Germans, let us be bold enough to face the facts; the whole nation has sold its soul to the Prussians, "the invincible swine" as they called them; they have to be shown that this chosen tribe was very far from being invincible; they have to pay, and to pay heavily, for choosing such material ends and such base means. But when all is said and done, we have to live in a world that will contain in all nearly 100,000,000 Germans, of whom not one-third are Prussians. We cannot afford to neglect German learning and German science, any more than German war-craft or German commerce and industry. All these German things have been overpraised, but we need not therefore refuse to make use of them. That would be a folly, and a folly of which they, on their part, will not be guilty. Therefore after the war we must look to a great increase of international intercourse, including in course of time intercourse with Germans. The French and German languages and also Italian and Spanish, must become much more familiar subjects of study in England. To effect this, it is not enough to offer modern language scholarships; for these will be won by aliens or by English boys whose parents happened to live abroad. The better way is to make one modern language as requisite a part of every university course as is already one ancient language; but, above all, to introduce it as a spoken language in all the schools. For it is only thus that we can build up a public opinion on the matter; and without such a public opinion the most urgent reforms remain on paper. There has been

much improvement of late; educationists, manufacturers, statesmen, have long concurred in the demand; the war has given a great impetus to it. Every year the need becomes greater for a student, whether of science or history, philosophy or theology, to read French or German or Italian, and every such student ought to add oral speech in those languages to his book knowledge of them, and then impress his convictions on those about him, and so help to drive conviction into the single-speech British public.

CHAPTER II

ON THE HISTORY OF CLASSICAL EDUCATION [1]

By Charles Stuart Parker

I. Greek as a Common Language.—II. The Early (Greek) Church and the Classics.—III. Latin as a Common Language.—IV. The Mediæval (Latin) Church and the Classics.—V. The Revival of Letters in Italy.—VI. The Revival of Letters in Germany.—VII. The Reformation and Classical Education.—VIII. Classical Education in England.—IX. English Theories of a larger Education.—X. Experience of Germany.—XI. Experience of France.—XII. Present State of Liberal Education in England.

Although there are many theories of classical education as it now exists, history can give but one account of its origin. It arose from the relations in which the Greek and Latin languages have stood, in the past, to the whole higher life, intellectual and moral, literary and scientific, civil and religious, of Western Europe. Greeks and Romans, as well as Jews, are our spiritual ancestors. They left treasures of recorded thought, word, and deed, by the timely and judicious use of which their heirs have become the leaders of mankind. But they left them in custody of their native tongues.

I. After Alexander, the Greek tongue spread widely through the East, and became the means of blending Oriental with Western modes of thought. Commerce

[1] For parts of this paper, materials have been taken from Von Raumer's and from Schmidt's "Geschichte der Pädagogik."

prepared the way for liberal intercourse. Ideas were exchanged freely with reciprocal advantage. But the Greek, offering new philosophy for old religion, obtained for Europe the more precious gift—

Χρύσεα χαλκείων, ἑκατόμβοι' ἐννεαβοίων.

No faith attracted more attention than that of the Jews. Their sacred books were carefully translated into the Greek language, and afterwards, by fanciful adaptation, and by real insight, expressed in terms of Greek thought. Greek philosophy meanwhile, embracing with reverence the long-sought wisdom of the East, went beyond the measure of Pythagoras, Socrates, or Plato, and often beyond the guidance of sober reason, in ascetic abstraction from the things of sense, and ardent longing after spiritual truth.

Christianity itself had Greek for its mother-tongue. St. Paul, a Roman citizen, writes in Greek to the Christians of Rome. The Epistle to the Hebrews is Greek, and so is that of St. James "to the twelve tribes scattered abroad." Indeed, it is now maintained that Greek had become the ordinary language of Palestine, and was spoken by our Lord himself.[1]

Nor did Western Christendom lay aside this tongue, provided by God to publish and preserve the Gospel, until the Greek mind had left its lasting impress on the doctrines of the Universal Church.

For great part of three centuries, the Churches of the West were mostly "Greek religious colonies." [2] Their language, their organization, their liturgy,[3] their

[1] Roberts' "Discussions on the Gospels."

[2] Milman's "Latin Christianity," i. 27.

[3] It is significant that the word *liturgy* is Greek, as are *hymn*, *psalm*, *homily*, and *catechism*, *baptism* and *eucharist*, *priest*, *bishop* and *pope*.

Scriptures, were Greek. The Apostolic Fathers, the apologists and historians of the early Church, the great theologians, orthodox and heretic, wrote and spoke Greek. The proceedings of the first seven Councils were carried on, and the speculative form of the Christian faith defined, in that language. It was hardly possible to handle the profounder questions in any other. Augustine is at a loss for words to speak of them in Latin. Seven centuries later Anselm undertakes the task with diffidence; nor is it clear whether in his own judgment he succeeds or fails.[1]

Thus, when Christianity became the State religion, and the emperor, in such broken language as he could command, took a modest part in the discussions of Nicæa, it was a last and signal spiritual triumph of captive Greece over Rome.

II. The ancient Church encouraged the study of heathen literature, but with a paramount regard to morality and Christian truth. Plato, Cicero, and Quintilian had pointed out the danger of using the poets indiscriminately as school-books; and the Father who slept with Aristophanes under his pillow would not have placed him in the hands of boys. But even Tertullian allowed Christian boys to attend the public schools under pagan masters.

Origen made the study of heathen poets and moralists

[1] His chief difficulty is to translate *ὑπόστασις*—" tres nescio quid . . . non possum proferre uno nomine . . . congruo nomine dici non potest . . . sicut non sunt tres substantiæ, ita non sunt tres personæ." Yet he uses *substantia*, apologising: " Græcos secutus sum, qui confitentur tres substantias in una essentia, eadem fide, qua nos tres personas, in una substantia." There are not, and there are " tres substantiæ: " there are not, and there are, " tres personæ." Such are the verbal contradictions which arose from the unfitness of the Latin tongue to render Greek thought.

preparatory to that of higher Christian truth. His master, Clement, taught that philosophy [1] was the testament or dispensation given to the Greeks, the schoolmaster to bring them, as the Mosaic law brought the Jews, to Christ. And his teaching was generally accepted. To this day "along the porticoes of Eastern churches, both in Greece and Russia, are to be seen portrayed on the walls the figures of Homer, Thucydides, Pythagoras, and Plato, as pioneers preparing the way for Christianity." [2] When Julian forbade the Christians to institute public schools of rhetoric and literature, in which pagan authors might be read, the bishops protested.

In short, the liberality of these early Fathers, their eagerness to recognise a high moral and intellectual standard, wherever it could be found in heathen writers, as "the testimony of a soul by nature Christian," and their faith that such excellent gifts are from God, furnish an admirable example of the spirit in which the Church may deal with questions of education, whether they relate to Greek philosophy and the classics, or to modern inductive science and free thought.

During this first Christian age, Greek was the common language of literature, while Latin, after Tacitus and Pliny, rapidly declined. The "Meditations" of the Emperor Marcus Aurelius are composed in the vernacular of the freedman Epictetus. No Latin names can be placed beside those of Lucian and Plutarch, Arrian and Dion Cassius, Ptolemy and Galen. At Athens and

[1] A faith afraid of philosophy, in his view, is a weak faith. Faith is a summary mode of knowledge (*σύνπομος γνῶσις*); knowledge is the scientific and reasoned form of faith (*ἐπιστημονικὴ πίστις, ἀπόδειξις*). Faith comes first, but let us add to our faith knowledge.

[2] Stanley's "Eastern Church," p. 35.

Alexandria, the great conservative and liberal universities,[1] studies in grammar and criticism were conducted side by side with philosophy and science. In both alike the Greek tongue was employed. Of all the considerable intellectual production which went on throughout the Roman world, jurisprudence alone was Latin.

III. But if Greek was the chosen language which carried literature, science, and wisdom, Christian, as well as heathen, to the highest pitch in the ancient world, Latin also was an appointed means of transferring them to Western Europe.

The imperial art of Rome laid the solid foundations on which, when the flood of barbarism began to subside, much of the old fabric was laboriously reconstructed, before the thoughts of man took a wider range. In Spain and Gaul Latin became the mother tongue. But in uneducated mouths it resumed that process of decay and regeneration, the natural life of a language spoken and not written, which only literature can arrest. Hence in time, Italians, as well as Spaniards, and French had to learn book-Latin as a foreign language.[2] It was to them what the writings of our forefathers would be to us, if "English" literature excelled English as Roman did "Romance." But other than literary interests maintained the old Latin as a common language beside the provincial dialects of the new.

The laws of the Western Empire, the last and

[1] Merivale's "Roman Empire," vol. vii.

[2] Dante (De vulgari Eloquentia) distinguishes the literary from the vulgar tongue as being acquired by long and patient attention to rule. "Grammatica locutio est secundaria. Ad habitum hujus pauci perveniunt, quia non nisi per spatium temporis et studii assiduitatem *regulamur et doctrinamur* in illa." His own Latin was uncouth.

greatest product of the ancient Roman mind, were adopted by the Gothic, Lombard, and Carlovingian dynasties, and in the twelfth century the first great European school at Bologna was thronged by students of Roman law.[1] At one time there were twenty thousand, from different countries, dividing their attention between civil and canon law, the Pandects and the Decretals. Both were studied with a view to advancement in life, but especially to Church preferment.

Indeed it may be said, with as much truth as is required in metaphor, that the ark which carried through the darkest age, together with its own sacred treasures, the living use of ancient Latin, and some tradition of ancient learning, was the Christian Church.

What at first had been everywhere a Greek became in Western Europe a Latin religion. The discipline of Rome maintained the body of doctrine which the thought of Greece had defined. A new Latin version, superseding alike the venerable Greek translation of the Old Testament and the original words of Evangelists and Apostles, became the received text of Holy Scripture. The Latin Fathers acquired an authority scarcely less binding. The ritual, lessons, and hymns of the Church were Latin. Ecclesiastics transacted the business of civil departments requiring education. Libraries were armouries of the Church : grammar was part of her drill. The humblest scholar was enlisted in her service : she recruited her ranks by founding Latin schools. " Education in the rudiments of Latin," says Hallam, " was imparted to a greater number of individuals than at present ; " and, as they had more use for it

[1] Roger Bacon and Dante both complain that no one would study anything but jurisprudence. (Dr. Döllinger's " Universities Past and Present.")

than at present, it was longer retained. If a boy of humble birth had a taste for letters, or if a boy of high birth had a distaste for arms, the first step was to learn Latin. His foot was then on the ladder. He might rise by the good offices of his family to a bishopric, or to the papacy itself by merit and the grace of God. Latin enabled a Greek from Tarsus (Theodore) to become the founder of learning in the English Church; and a Yorkshireman (Alcuin) to organize the schools of Charlemagne. Without Latin, our English Winfrid (St. Boniface) could not have been apostle of Germany and reformer of the Frankish Church; or the German Albert master at Paris of Thomas Aquinas; or Nicholas Breakspeare Pope of Rome. With it, Western Christendom was one vast field of labour: calls for self-sacrifice, or offers of promotion, might come from north or south, from east or west.

Thus in the Middle Ages Latin was made the groundwork of education; not for the beauty of its classical literature, nor because the study of a dead language was the best mental gymnastic, or the only means of acquiring a masterly freedom in the use of living tongues, but because it was the language of educated men throughout Western Europe, employed for public business, literature, philosophy, and science, above all, in God's providence, essential to the unity, and therefore enforced by the authority, of the Western Church.

IV. But the Latin of the Middle Ages was not classical, and in the West, Greek became an unknown tongue. Cicero did less to form style than Jerome; Plato was forgotten in favour of Augustine; Aristotle alone, translated out of Greek into Syriac, out of Syriac into Arabic, out of Arabic into Latin, and in Latin

purged of everything offensive to the mediæval mind, had become in the folios of Thomas Aquinas a buttress, if not a pillar, of the Christian Church.

The neglect of heathen writers began in an age when the clergy were contending against Paganism as well as barbarism. In quieter times the best Latin classics reappear, and instead of hymns such as *Dies Iræ* or *Veni Creator Spiritus*, there are crops of tolerable verse in classical metres. Still, the aim of mediæval differs from the aim of classical education. It may be well therefore to know what, at the worst, the former was, before seeing it in conflict with the latter.

Among Churchmen, Gregory the Great has been selected as an example of "prepossession against secular learning carried to the most extravagant degree." His conception of its use and value may be gathered from his commentary on the First Book of Kings. The Israelites went down to the Philistines to sharpen every man his share, and his coulter, and his axe, and his mattock. So Christians must go down into the region of secular learning to sharpen their spiritual weapons. Moses was trained in the learning of the Egyptians: Isaiah had a better education than Amos: St. Paul was a pupil of the great Gamaliel. There are depths of meaning in Holy Scripture which no unlearned person can explore. The liberal arts, therefore, are to be studied so far as by their aid revealed truth is profoundly understood.

Secular learning, not as complementary but as subordinate to Holy Scripture; such was the professed aim, in barbarous times, of "one who has been reckoned as inveterate an enemy of learning as ever lived." But the practical meaning of such an aim depends on the zeal and judgment with which it is pursued. And

in practice, Gregory did not show much regard even for the first of liberal arts. Witness his account of his own habits as a writer :—" I am at no pains to avoid barbarous confusions. I do not condescend to observe the place or force of prepositions and inflections. My indignation is stirred at the notion of binding the words of the heavenly oracle under the rules of Donatus."[1] Such language from a Pope was not likely to promote the right understanding of Scripture.

Charlemagne reproves his bishops for bad grammar in their letters to him. He too desired to promote secular learning in subordination to Holy Scripture. It was for this that he founded his cathedral and conventual schools.[2]

Neither churchmen as such, nor statesmen, were the enemies of grammar. Nor were the lawyers greatly to blame. One of them, indeed, is accused of having said, " De verbibus non curat jurisconsultus." But this is doubtless a foolish sneer at men whose learning, while directly useful to society, was not less important for moral and political science, studies of high rank in liberal education.

The true and tough antagonist that must be vanquished before Cicero and Virgil could prevail, was neither the old Church Latin, with its ornate rhetoric, nor Law Latin, which neglected style. It was the more recent Latin of the schools that provoked, fought, and lost the battle against Latin of the Augustan age.

[1] From the first Christianity spoke the language of the people; many of the Fathers affect rudeness of speech. " I am a disciple of fishermen."—*Basil.* " Once for all, I know *cubitum* is neuter; but the people makes it masculine, and therefore so do I."—*Jerome.* " We are not afraid of the grammarian's rod."—*Augustine.*

[2] " Psalmos, notas, cantus, computum, grammaticam, per singula episcopia et monasteria discant."

The scholastic philosophy, like German metaphysics, had a style and dialect of its own. It had constructed an apparatus of abstract terms, which were supposed to correspond, like those of modern science, with the most essential distinctions of things. With this key it endeavoured to unlock even the mysteries of theology, and penetrating the secret of existence, to command the whole realm of knowledge. It thus combined moral and religious speculation with the promise of natural science. It was accepted by thousands of active minds as a comprehensive system of thought, exalted above the shafts of ignorant ridicule or literary censure. It was for this that eager students, in the thirteenth century, crowded the Universities of Paris and of Oxford. Engrossed with the sublime objects and powerful method of the new philosophy, they neglected rhetoric for logic.

"A party," says Hallam, "hostile to polite letters, as well as ignorant of them—that of the theologians and dialecticians—carried with it the popular voice in the Church and universities. The time allotted by these to philological literature was curtailed, that the professors of logic and philosophy might detain their pupils longer." Their Latin did not aspire to be the Latin of Cicero but a Latin for expressing truths to which Cicero had not attained. With the Latin of Cicero in the domain of higher education, School Latin could make no terms. If it did not conquer it must die.

This indifference to literary form was carried so far as to provoke reaction. The lesser Schoolmen and their pupils became ridiculous by their slovenliness and blunders in the Latin of every-day life. The earlier names stand above this reproach. Lanfranc and Anselm have the good word of Hallam: he praises the

letters of Abelard, while preferring those of Heloisa. But the decadence was rapid: the tongue habitually spoken in the universities became to cultivated ears a jargon. The *Oxoniensis loquendi mos* [1] was proverbial, and only less intolerable than that of Paris. In a satirical poem of the thirteenth century, entitled "The Battle of the Seven Arts," Grammar is encamped in Orleans, Logic in Paris. Grammar, in whose ranks are the ancient poets, is beaten out of the field. In the great library of Paris, when the fourteenth century began, there was not a copy of Cicero, nor any poet but Ovid and Lucan. The study of civil law was also forbidden. School theology and school philosophy reigned supreme.

V. Driven out of France, the poets rallied in Italy. Three great Florentines embraced their cause—the first, himself an adept in the wisdom of the schools.

The homage of Dante to Virgil, in the great work in which (rejecting Latin) he laid the foundation-stone of the Italian language, did much to kindle in his fellow-countrymen that affectionate [2] veneration for their ancient poet which has never perhaps been so deeply felt elsewhere as in his native land. Well for Italy, if all the objects of her literary worship had been as noble, or the worshippers as pure in heart.

[1] A Visitor, in 1276, officially condemned the phrase *Currens est ego*. Oxford logic can still match it, in English, if not in Latin.

[2] The feeling finds touching expression in a hymn sung at Mantua on the Feast of St. Paul. The Apostle, on landing in Italy, is taken to see the poet's grave:—

"Ad Maronis mausoleum
Ductus, fudit super eum
Piæ rorem lacrymæ:
Quem te, inquit, reddidissem,
Si te vivum invenissem,
Poetarum maxime."

Boccaccio, half a century later, devoted himself at Virgil's tomb to literature and art, read Homer in Greek, and acquired reputation by his Latin eclogues. He also wrote, and repented having written, the tales which are regarded as the first-fruits of Italian prose.

But the chief leader of the revolution which overthrew the Schoolmen was Petrarch, whose whole soul was in the enterprise of reinstating the ancient masters of language. He, while Schoolmen despised him as an unlearned poet, set the first example of that enthusiastic collection and preservation of classical manuscripts, for which Italy has earned unceasing thanks. In childhood his fine ear had been taken captive by the music of a Ciceronian sentence. He lamented bitterly that through ignorance of Greek he was deaf to the melodies of Homer. Virgil he studied with such zeal, that he was suspected of learning the black art, and employing the great magician's charms in the composition of his own verse. His Latin epic, "Africa," enchanted even the University of Paris. But, though invited to receive the poet's wreath at the hands of philosophers, he preferred honour in his own country; where he was conducted with extraordinary pomp and popular enthusiasm, attended by dancing satyrs, fauns, and nymphs, and escorted by all the gods of Olympus, to the Capitol, and crowned by the Senator of Rome. Thence proceeding to the ancient Christian Basilica, and kneeling before the altar, he offered his garland of ivy, laurel, and myrtle to St. Peter.

Later in life, he felt that the Latin epic was not a masterpiece, and that his Italian sonnets better deserved the crown. But his countrymen of that age did not think so. The artist could best judge of his own execution; Italy knew what had been her ideal. Her

imagination was fixed on the revival of the past. Scipio, not Laura, had shared the poet's triumph. More than a century had yet to pass before the mother-tongue came into literary favour; more than two centuries before the Academy, passing by Dante, made Petrarch the standard for verse, Boccaccio for prose. For the present Italian scholars laboured heart and hand to establish the classical form of culture.

They received invaluable aid from the Greeks who settled in Italy during the half century before and immediately after the capture of Constantinople. Although the vulgar tongue of Greece was now Romaic, educated society had retained the ancient language. Its resuscitation in Western Europe created a new epoch. "For seven hundred years," says Aretino, speaking of Chrysoloras, the first Greek professor at Florence (1396), "no Italian has been acquainted with Greek literature, and yet we know that all learning comes from the Greeks." The poets more than doubled their ranks, and made common cause with the mighty philosophers of Greece. Cosmo founded a Platonic Academy: the Professor of Greek literature at Florence lectured on "the great master of the wise." The Latin Aristotelians asked with indignation how a philosopher could be expounded by one who was none. Politian replied, that a king's interpreter need not be a king.

With the general literature and philosophy of the Greeks, their natural history, physics, mathematics, medicine, and other sciences,[1] were revived. Everything contributed to restore the past. Greek was learnt as a living language. Latin was spoken in polite

[1] The founder of modern astronomy, and the first President of the College of Physicians (Linacre), were eager students in Italy.

society. There was no modern history, philosophy, or science which could compete with the treasures daily discovered in the virgin soil of ancient manuscripts. Both form and substance had the charm of novelty for all men, so that the same thoughts were active in the minds of old and young. The revival of antiquity flattered the political instincts of the people. And it was highly for the honour of Italy to lead the other nations of Europe to the admiring study of her greatest writers.

On the other hand, a passion for attaining to the new standard of literary excellence led many scholars to neglect the more solid parts of a liberal education. Zeal for the ancient languages did more at first to repress and cramp than to foster and direct the growth of the mother-tongue. And the good sense of the many was perverted in straining after an ideal attained at most only by the few. Their art does not conceal the want of nature : their works bear the fatal stamp of second hand.

In all endeavours to revive the past it is easy unawares to overstep the line which divides imitation from caricature. The revival of a pagan ideal in a Christian country caused constant embarrassment in the choice between the unclassical and the incongruous. When Dante wrote

> " Oh sommo Giove,
> Che fosti 'n terra per noi crocifisso,"

he did not violate good taste or Christian feeling more than Pope, when in his " Universal Prayer " he unites the names

> " Jehovah, Jove, or Lord."

But Boccaccio's phrase for the Resurrection, "il glorioso partimento del figliuolo di Giove dagli spogliati

regni di Plutone," is scarcely more irreverent than it is absurd. And Boccaccio is outdone by Bembo, who not only speaks of Leo X. as vicegerent of "immortal gods," but even when writing in the Pope's name presumes to call the Holy Spirit "Zephyrus cælestis," and the Virgin Mary "dea Lauretana."

And, worse than bad taste, with the return to pagan models in literature and art, there was a return, not indeed to pagan belief, but to pagan unbelief and pagan vice. The sixth Cæsar, as Pontiff, did not wear a thinner veil of religion than the sixth Alexander. The most profligate heathen had written nothing so bad that an Italian scholar of the worst sort did not think it worthy of transcription, comment, and imitation. The state of morals deterred many in this country from sending their sons to Italy for classical instruction. The Italians themselves had a motto, "Inglese italianato è un diavolo incarnato."

Some of the dangers attending the revival of classical literature were plainly seen at the time. Petrarch writes—"Above all, let us be Christians. Let us so read philosophy, poetry, and history, that our hearts may be ever open to the Gospel of Christ. The Gospel is the one sure foundation on which human industry may securely build all true knowledge." Vittorino, the most renowned Italian of those times for his educational labours, made his pupils read Christian as well as heathen books. He also instructed them in logic and metaphysics (not of the scholastic type), mathematics and the fine arts, and watched carefully over their moral character. But his zeal for the classics was such that he had little regard for the mother-tongue. Lorenzo endeavoured by precept and example to enforce cultivation of the mother-tongue, but found fashion too

strong for him except among his personal friends. In Florence the first and most peremptory command of fathers to sons and masters to pupils was, on no account, to read anything vulgar.[1]

Pico di Mirandola wrote a defence of the Schoolmen in excellent classical Latin, and disputed at Rome in the Latin of the schools. To perform such an exercise in Ciceronian Latin would have been as impossible as to conduct the Nicene debates in the Latin of the later empire.

But Italian scholarship generally seemed rather to bathe itself with ever new delight in the refreshing waters of the past, than to evolve the intense spiritual fire which was needed to sever the gold from the dross, and unite the classical with the Christian ideal, old things with new.

Nor can it fail to be observed how slight and superficial was the part played by the Italian people at large in the movement. Classical education in Italy seems to be the education of princesses and of princes, of noble ladies and young men of rank and fortune. Such was the work of Guarino, who had distinguished Englishmen among his pupils: such in the main was the work of Vittorino, whose establishment, beautifully decorated by art, and surrounded by gardens and woods, was known as the Casa Giojosa. Vittorino, however, spent all his own means and interested his high-born pupils in assisting poor scholars, some forty of whom he

[1] "Che eglino, nè per bene, nè per male, non leggessero cose volgari."—*Foscolo* (quoted by Raumer). This proscription would include the "Legends of the Fourteenth Century," lately republished. Written for the people, they are admirable for vigour and directness of style, and would have been a good corrective of literary pedantry, as well as heathen vice.

contrived to feed, clothe, and instruct, as well as to visit hospitals and prisons. It may be that there was more such instruction of the people than appears. At least the general fact cannot be mistaken. Although in the revival of Letters Italian enthusiasm and Italian scholarship, aided by the Greeks, supplied at first all the working power, it was not until the pursuit of the new ideal had been carried beyond the Alps that it changed the whole course of school education.

VI. Looking from Italy to Germany, we see a complete contrast of race, of mother tongues, of history, of religious temper, and generally of national character. It was only natural that Italian scholars should doubt, and leave it for Germans themselves to try, whether the noble and graceful literature of the ancient world, which, when once revived, seemed hardly more exotic than indigenous in Rome or Florence, could flourish in the Northern soil. Yet in truth, Germany presented the conditions necessary for its successful cultivation, though with underlying spiritual diversity, which must profoundly modify the type.

Christian Rome had subdued the barbarians, and had laid upon them, for all higher purposes of life, the yoke of a foreign language. Long did the luckless Germans toil to frame their lips aright: marvellous were their failures,[1] and marvellous their success. By

[1] The chief difficulties were inflections and pronunciation. In planting the Church, St. Boniface found one of his Germans baptizing "In nomine Patria, et Filia, et Spiritui Sancta." Reuchlin was recommended for an Italian mission as having a tolerable accent, "sonum pronuntiationis minus horridum." Würtemberg regulations of the 16th century enact that children whose German mouths by nature cannot pronounce all the letters, are not to be dragged by the hair, or immoderately flogged. Necessity had not yet given birth to the invention of pronouncing Latin by the rules of the mother tongue.

frequenting foreign universities,[1] and by that infinite capacity for taking pains, which is the national genius of the German,[2] their educated men had attained to a Latin which passed muster among the dialects of the schools.

In the fifteenth century, the Brethren of the Common Life, or Hieronymites, had perhaps a hundred establishments in the Low Countries and parts of Germany and France where they gave instruction in reading, writing, speaking, and singing Latin. At their chief college, Deventer, a scholar was punished for letting fall a single word of Dutch. Their best Latin probably resembles that of the "Imitatio Christi," a book of which Europe has been content to read two thousand editions in the original, while it has but once been translated "from Latin into Latin." The same book may give some notion of their educational ideal, which was sublime, but on a narrow foundation. Everything was subordinate, not so much to Scripture, as to the spiritual life. But their conception of spiritual life wanted breadth. Their founder, Gerard Groot, a mighty preacher in the mother tongue, had experienced a strong reaction from magic, necromancy, and scholastic philosophy, which he had studied at Paris. "Spend no time," he charges them, "on geometry, arithmetic, rhetoric, dialectic, grammar, poetry, horoscopes, or astrology. Such pursuits are renounced by Seneca, much more by a Christian of spiritual mind. They avail not for the spiritual life. Of heathen sciences the moral are least to be shunned. The wiser

[1] Their own universities did what they could. Ingolstadt, for example, enacted "Quod nullum suppositum in communitatibus bursarum aut in aliis locis bursæe Theutonicum loqui audeat." But they got no better Latin than they gave.

[2] "Das Genie ist der Fleiss."—*Schiller*.

heathens, such as Socrates and Plato, applied themselves to these." This injunction against all the liberal arts but music, left the brethren ample time for spiritual exercises, and for a work which they had much at heart, the elementary instruction of the people.

Experience so far corrected their narrowness, that from their schools chiefly went forth the men who sowed the seeds in Germany of the classical revival, as well as of the religious reformation. Thomas à Kempis (it is said) exercised much influence at their school at Zwoll over Wessel, who, though but a moderate Greek and Hebrew scholar, was the greatest theologian of his time.[1] Wessel, in his turn, if not Thomas à Kempis himself, was in intimate relations with Hegius, Agricola, Lange, and Dringenberg, who were all educated by the brethren. Of these, Hegius presided over the College of Deventer for thirty years (1438–1468), and trained many good scholars both in Latin and in Greek. He speaks with enthusiasm of the importance of Greek. "If any one wishes to understand grammar, rhetoric, mathematics, history, or Holy Scripture, let him learn Greek. We owe everything to the Greeks." Writing to Wessel to borrow the Greek Gospels, he thus ends his letter—"You wish to be informed more precisely about my teaching. I have followed your advice. *All learning is hurtful, when acquired with spiritual loss.*"

This was still the noble Shibboleth of the school. But it was found compatible now with classical education. Of all the scholars sent out from Deventer one

[1] Such was Reuchlin's estimate. Luther's confidence in his own convictions was greatly increased by their agreeing with Wessel's so closely that, if he had known Wessel's writings sooner, he might have been accused (he himself says) of plagiarism.

only of any mark,[1] Adrian VI., had the reputation of being unfriendly to classical culture, such as he found at Rome after Leo X.

Agricola proved that it was possible for a German to attain to the highest standard of pure Latin and of classical erudition. He valued his liberty too highly to become a schoolmaster, but was much consulted in all questions of classical education.

Lange rooted out the old school-books, and set up a flourishing classical school at Münster. "I have great confidence," writes Agricola, "in the success of your labours. I believe our own Germany will attain to such learning and culture, that Latium itself shall not be more Latin." The new ideal stands before his mind. Lange lived to see its advent. Reading in his old age the theses of Luther, "Now is the time at hand," he exclaimed, "when darkness shall be driven from the land: sound doctrine shall return to our churches, and pure Latin be taught in our schools."

Dringenberg was Rector (1450–1490) of a school at Schlestadt, which sent out many brilliant scholars. Of younger Daventrians, Busch made himself an itinerant apostle of classical education, lecturing in England and France, as well as in Germany. He accomplished the public abolition of the mediæval schoolbooks at Erfurt, but was expelled from Leipsic and thrice from Cologne, strongholds of the old grammars, where he attempted similar reforms.

The most distinguished of Daventrian scholars, Erasmus, praises the character, learning, and ability of his master, Hegius, but attacks the brethren as

[1] Another, Ortuinus Gratius, has an unenviable notoriety as the master at Cologne to whom the "Epistolæ obscurorum Virorum" are addressed.

exercising an illiberal influence over education. His ideal differs from theirs. Indeed, the one factor in the educational movement of his time which Erasmus most imperfectly represents, is the deep spiritual earnestness of the men, to whom, in common with many forerunners of the Reformation, he owed his early training. His merciless satires did much to stimulate that contempt for monks which was preparing at once what he intended and what he did not intend, a revolution in education, and the violent disruption of the Church. Even his Colloquies, for boys from eight years of age, which came into general use as a school-book, are full of open or covert attacks on monks, relics, pilgrims, and generally on all forms of religion which he regarded as superstitious : so much so, that the book was condemned by the Sorbonne, forbidden in France, burnt in Spain, and placed on the Index at Rome. Melanchthon allowed selections only to be used in schools.

As an educational reformer, Erasmus was not likely to be misled into the extreme of Italian fashion. He had greater work on hand than the greatest of Latin epics, or the purest of Latin styles. His extensive acquaintance with ancient literature made him despise prostrate adoration of individual writers. His sense of the superior importance of scriptural and theological studies raised him above enthusiasm for mere literary culture.

So far as the true interests of classical education were concerned, his sarcastic pen was seldom better employed than in writing his " Ciceronianus," an onslaught on the superstition of using none but Cicero's Latin. Of all moderns, Erasmus was in the best position to understand the necessities of Latin as a living tongue. For, while he wrote and spoke with singular fluency and spirit on almost every topic of the day, he vaunted his

ignorance of Italian, and was equally ignorant of French, English and German. In his " Ratio Studiorum " he strongly recommends translation from Greek into Latin, as giving insight into the comparative powers and idioms of each language, and showing what *we* have in common with the Greek. This casual expression indicates how completely Latin was regarded as the language of all education. The corresponding exercise in the present day would be careful written translation from the classics into the mother-tongue.

His Greek grammar contributed to facilitate the study of the language in Germany. But his great work was his Greek Testament, which, though printed later than the Complutensian, was the first edition actually published, in 1516.

Reuchlin shares with Erasmus and Agricola the credit of introducing the study of Greek from Italy into Germany. The foundation of Hebrew learning was laid by Reuchlin alone, in his " Rudiments of the Hebrew Tongue," published in 1506.

These two great works, Reuchlin's " Rudiments " and the New Testament of Erasmus, stimulated to the utmost in Germany the study of Hebrew and Greek, which now resumed their dignity as the sacred tongues, dethroning the language which had long been their vicegerent in the Western Church. The same two books enabled Luther to complete his German Bible. But long before it was published the great struggle had begun, and the further fortunes of classical culture became involved in the progress and results of the Reformation.

VII. How closely the interests of classical as well as popular education were bound up with those of religious reform appears nowhere more plainly than in Luther's

"Letter to the Burgomasters and Town-councillors of all the Towns of Germany, moving them to found and maintain Christian Schools. Anno 1524."

Extracts can give but a feeble impression of its drift and power. It is the stirring appeal of a leader of men, rousing the dull and rallying the noble to a war against Ignorance in her strongholds. But it is also the prophetic warning of a great seer, the burden of Germany. The argument comes on like an advancing tide: the movement of history is in it. Behold, all things are ready! The voice is the voice of Luther, but the call is the call of God.

"Of a truth Almighty God hath graciously visited Germans in our own land, and brought us a right golden year. See what learned young fellows we have now, and grown men, fine scholars in the languages and all the arts. Ay, and useful too, if you would use them to teach the young folk. Do not your own eyes see that a boy can be taught now in three years, so that at fifteen or eighteen he knows more than all high schools and cloisters ever knew till now?

"My good friends, buy while the market is at your door. Make hay while the sun shines. God's grace is like the passing shower, which does not return where it has been. Therefore lay hold, and hold fast, whoever can: slack hands gather scanty harvests.

"The people that we want will not grow of themselves. We cannot carve them out of wood, nor hew them out of stone. God will not work a wonder to help us, when He has given us wherewith to help ourselves.

"But if we must have schools, say you, what is the use of teaching Latin, and Greek, and Hebrew, and other liberal arts? Cannot we teach the Bible and

God's Word in German? Is not that sufficient for salvation?

"Why, if there were no other use of the tongues, it ought to gladden our hearts and kindle our souls, that they are such a noble, beautiful gift of God, which he is bestowing now so richly on us Germans, more almost than on any other land.

"But true though it be that the Gospel came and comes only by the Holy Spirit, yet it came by means of the tongues, and thereby grew, and thereby must be preserved. For when first God sent the Gospel by the Apostles throughout the world He gave the tongues also. Aye, and beforehand, by the Roman rule, He had spread the Greek and Latin tongues in all lands, that His Gospel might bear fruit far and wide. So hath He done now. No one knew to what end God was bringing forth the tongues again, till now it is seen that it was for the Gospel's sake. To that end He gave Greece to the Turks, that the Greeks, driven out and scattered abroad, might carry forth the Greek tongue, and so a beginning might be made of learning other tongues also.

"As we hold the Gospel dear then, so let us hold the languages fast. If we do not keep the tongues, we shall not keep the Gospel. As the sun to the shadow, so is the tongue itself to all the glosses of the Fathers. Ah, how glad the dear Fathers would have been if they could have so learned Holy Scripture."

In the foreground of all Luther's thoughts on education, stands the knowledge of Holy Scripture, rightly understood by diligent use of human learning,[1] under guidance of the Holy Spirit, an attainment demanding, as he knew by experience in translation, a

[1] "Nihil aliud est Theologia, nisi Grammatica in Spiritus Sancti verbis occupata."—*Luther*.

different discipline from that which satisfied Gregory, or Gerard Groot, or, in his own time, the Vaudois, whom he censures for neglect of Greek and Hebrew. But the languages are in no servile subordination. Glorious and beautiful in themselves, they become holy by ministering freely to the mind of God. Holy is the Hebrew tongue, for to it first were committed the oracles of God. Holy is the Greek tongue, for it was chosen to be the well-spring of the Gospel. But hallowed also is every other tongue into which the waters from that well-spring have flowed. Whereas without the sacred tongues, and without the Gospel, Germany has sunk so low, that her wretched people, like poor dumb cattle, can neither read nor write good German, nor good Latin, and have well-nigh lost the use of their natural reason. Not only the sacred tongues, therefore, but German and Latin, not only religious, but secular literature is to be studied. Next to the Bibles in all tongues and the commentators, in a library, are to stand books which help to acquire the languages, such as the works of poets and orators, be they heathen or Christian, Latin or Greek. Education has been religious only, so that it has been held a kind of scandal for a scholar to marry. It must be so now no longer. Even if there were no soul, no heaven, and no hell, there would still be need for schools to train boys and girls into sensible men and women. Jurists as well as theologians are wanted. If those two professions were to cease, ere long, between war and crime, your tradespeople would be glad to grub with their fingers ten ells deep for a learned man. Recruits for the gown must be obtained as recruits are obtained to bear arms. If rulers may compel able-bodied youths to carry spear and gun, so may they compel boys of able mind to go to school for

their own and their country's good, and be trained for holy orders or the law.

Luther's scheme of national education embraces high and low, rich and poor; or rather, perhaps, he hardly supposes that the high-born will deign to devote themselves to the learned professions. But every poor boy of good capacity is to be enabled, nay compelled, to study the learned tongues, and to fit himself to serve God in Church and State. Latin, and Greek, and Hebrew are not to be articles of luxury for the rich, but to be taught freely to all who will learn, in every town.

In denouncing the old schools, Luther's language becomes unmeasured. Nowhere is there one good school. Nothing has been learned in cloister-schools and high schools, but to be asses, blockheads, and dolts. Twenty, forty years one might learn there, and in the end know neither Latin nor German, or, perhaps, enough bad Latin to be a priest, and say mass.

The Universities also want "a good strong reform." They have become mere places of resort for free living and vain-glory. Little is heard of Holy Scripture and the Christian faith. The blind heathen Aristotle is their master rather than Christ. If Luther's advice were taken, Aristotle's Physics, his Metaphysics, his "De Anima," and his Ethics, should all be turned out together, since no one yet has understood their meaning; his Logic, Rhetoric, and Poetics should be kept for training youths to speak and to preach. With these should be studied the learned tongues, mathematics, and good histories, which are of more worth than all philosophy for the guidance of life.

For the schoolmaster's office, Luther had unbounded respect. "If I were not a preacher of the Gospel," he declares, more than once, "I know no station on

earth that I would rather fill than that of a schoolmaster or teacher of boys."

His just sense of the importance of education, and his broad views of its relations to the whole framework of society, give his opinions an intrinsic value, which goes far to make good the want of practical experience.

But if Luther, with all his zeal for the tongues, never taught them, he had a colleague who never preached, but devoted his whole life to the work of education, "the Professor of Germany," Melanchthon.

At twelve years of age Melanchthon went to Heidelberg, and was Bachelor of Arts at fourteen, having been taught wordy Logic and a smattering of Physics. At seventeen he took his Master's degree at Tübingen, and lectured on Virgil and Terence. Four years later he became Professor of Greek at Wittenberg, where he spent the remainder of his days (1518–1560).

Wittenberg, though the youngest, was the leading University of Protestant Germany; and Melanchthon was both the leading spirit of Wittenberg, and chief adviser in the organization of Protestant schools. His writings are a rich mine of facts concerning German classical education.

His report on churches and schools (1528) became the basis in Saxony of a reformed scholastic, as well as ecclesiastical establishment, independent of Rome. The example was followed in other German states. The report recommends the following regulations for schools: [1]—

1. The children to be taught Latin only, not German, Greek, or Hebrew. Plurality of tongues does them more harm than good.

2. They are to be kept to a few books.

[1] What does not bear on classical education is omitted.

3. They are to be divided into three classes. The first to read Donatus and Cato, and learn a list of Latin words daily. The second class to read Æsop's Fables, and select colloquies of Erasmus, and learn Latin proverbs. Also, grammar is to be well worked into them, and learnt by heart. When they know the rules of construction, they are to "construe," as it is called, which is very useful, and yet little used. As they grow older, they are to learn by heart Terence, and after Terence, Plautus; the pure plays only, as the Aulularia and Trinummus. One day in the week to be set apart for Christian instruction: St. Matthew to be expounded grammatically. Older boys may read easy Epistles or the Proverbs, but not Isaiah, Paul to the Romans, St. John's Gospel, or the like. The third class, the picked intellects of the school, to read Cicero's Offices and Letters, and Virgil, and say Virgil by heart. When Virgil is done, they may read Ovid's Metamorphoses.

When they thoroughly know their etymology and syntax, they are to learn metre and compose verses. This exercise is a great help to understanding the writings of others, makes the boys rich in words, and gives dexterity in many things. Speaking Latin is also enforced. The master, as far as may be, to speak only Latin.

Melanchthon insists on the importance of grammatical knowledge, especially for the right interpretation of Scripture. How many controversies turn on the meaning of a word. Neglected Grammar has avenged herself on the monks,[1] by letting them take spurious things for genuine. He rejects the notion that

[1] One of their masters, expounding the text "Melchisedec Rex Salem panem et vinum obtulit," enlarged on the spiritual significance of salt.

scholarship may be attained by reading, without grammatical study. Such scholarship is never safe, nor thorough.

His Latin grammar, which went through fifty editions, was in general use in German schools of the sixteenth century. The rules were few, lest boys should be alarmed. His Greek Grammar was written at fourteen, and recast in maturer years. In the preface to a Hebrew Grammar, which had his sanction, he lays it down as certain, by consent of the learned, that no one can undertake anything considerable in sound scholarship without Hebrew.

His Manuals of Logic, Physic, and Ethics were for the most part [1] introductions to the Greek text of Aristotle, whose tenure of exclusive rights in liberal education was renewed in Germany for another century by Melanchthon's influence. His Rhetoric was a similar introduction of Cicero and Quintilian, following whom he regarded the orator's art as requiring profound learning, great gifts, long practice, and acute judgment. He felt the importance of Christian rhetoric in the age of the Reformation.

These school-books, intended to lead the young student to the great classical masters of thought and language, were, in fact, much used to save the trouble of going to the fountain-heads. The use of Melanchthon's philosophical manuals became known as "the Philippic Method," and the imitation of his manner [2] as "the Philippic Style."

But, though the building never rose to its intended

[1] He added to the Physic what he knew of modern discoveries, introducing Physiology, for instance, to illustrate the "De Anima."

[2] "He far excelled Erasmus in purity of diction and correctness of classical taste."—*Hallam.*

height, the ground plan shows that the great educator of Germany was far from adopting the dimensions of a merely literary training. He laid under contribution all departments of knowledge [1] and set forth the conception of a truly liberal and many-sided education, not without practical regard to the requirements of Church and State. It remained for experience to show how much of this was beyond the ambition or the reach of an ordinary student.

Melanchthon's own experience must have taught him much. In an inaugural lecture he contrasts the old course with the new. It is charged against the new studies by the adherents of the old, that "after much toil there is little fruit. Greek is taken up lightly for display; modern Hebrew is of small account; meanwhile, sound learning is falling into disuse, philosophy is forsaken."

On the contrary, the truth is that these philosophers have entirely missed the meaning of Aristotle, to understand whom in Greek is difficult, in the Latin translations of the Schoolmen is impossible. He himself (the professor, aged twenty-one) for six years of his life almost ruined his mind in the school of these pseudo-Aristotelian Sophists, who are the very reverse of Socrates. For whereas the one thing which Socrates knew was that he knew nothing, the one thing which they do not know is that they know nothing.

Instead of their philosophy the University of Wittenberg teaches the genuine Aristotle in the Greek, mathematics, the classical poets, orators, and historians, and true philosophy.

[1] He prepared a Latin Manual of History, and enforced arithmetic and mathematics. Morhof calls him "verum πολυμαθείας parentem."

Melanchthon himself lectured with success on Ethics, Logic, and Natural Science, using for each subject the Greek text of Aristotle, as the statutes required.[1] Luther speaks of the crowds that thronged his lecture-rooms from all countries, including England, Italy, and Greece. But, alas for Mathematics! Erasmus Reinhold, a distinguished friend of Copernicus, could not obtain a decent attendance at his lectures. Melanchthon's lectures on Ptolemy [2] met with the same fate. And, alas for the Greek classics! Homer begged for readers as in his lifetime he begged for bread. Wittenberg was deaf to Demosthenes, and would none of Sophocles. "I see," said Melanchthon at last, "that this generation has no ear for such authors. Scarce a few of my audience remain, to spare my feelings. I owe them thanks." At the Universities, as at the schools, much more attention was directed to Latin than to Greek. Terence, for whom there was a special professorship at Wittenberg, owes more even than Aristotle to Melanchthon, who used all his great authority to introduce the plays into schools.[3]

Of Melanchthon's pupils it must suffice briefly to

[1] "Enarrabit Ethicus Græca Aristotelis Ethica ad verbum . . . Physicus enarrabit Aristotelis Physica."

[2] De Apotelesmatibus et Judiciis Astrorum.

[3] "Hardly any book," he says, "is more worthy to be in the hands of all mankind. In exact adjustment of the expression to the thought, he has surpassed them all. If St. Chrysostom delighted in Aristophanes (doubtless as a model of eloquence), how much more is Terence to be prized, whose pieces are free from the disgusting grossness of the Greek poet, and whose style is even more perfect. Therefore, I exhort all schoolmasters to recommend this author in the most pressing way to young students. For he seems to me to form the judgment on affairs of the world better than most of the books of philosophers. And no other author will teach the boys to speak Latin with equal purity, or train them to a style which will stand them in better stead."

mention those who did most to carry on the work of classical education. Camerarius, Rector at Nürnberg, is better known as a philologist, and as Melanchthon's biographer, than as a schoolmaster.

Trotzendorf, at Goldberg, laid a narrow classical foundation for professional studies. Latin verses and Latin letters were written every week. No phrase was to be used unless the author from whom it came could be pointed out. No language but Latin was spoken, even by the servants. Some of the scholars read St. Paul in Greek, and the Old Testament in Hebrew.

Michael Neander presided at Ilfeld over a school which Melanchthon considered to be the best in the country. His pupils (Neandrici) were noted at the Universities for taking the lead [1] from their first arrival. They began Latin at nine, Greek at thirteen, Hebrew at sixteen. He wrote many school-books, and took considerable pains with History, Geography, and Natural Science.

Hieronymus Wolf was Rector of a Gymnasium at Augsburg, which undertook "to carry scholars so far in religion, the ancient languages, and philosophy, that they might be able to study at the University without the help of a tutor." He pronounced against making the younger boys [2] speak Latin, and against requiring verses *invita Minerva*.

Like Melanchthon, he remembered that the languages are but means to higher ends, solid learning, philosophy, and sound religion. "Happy were the Latins," he says "who needed only to learn Greek, and that not by

[1] He ascribed his success in teaching to simplicity: "Plerique fere abhorremus a simplici simplicitate quæ tamen discentibus est utilissima."

[2] "Nec minima pueri virtus est tacere, cum recte loqui nesciat."

school-teaching, but by intercourse with living Greeks. Happier still were the Greeks, who, so soon as they could read and write their mother-tongue, might pass at once to the liberal arts and the pursuit of wisdom. For us, who must spend many years in learning foreign languages, the entrance into the gates of Philosophy is made much more difficult. For, to understand Latin and Greek is not learning itself, but the entrance-hall and ante-chamber of learning."

But the school most characteristic of the century, was that of Strasburg, under Sturm, who was Rector forty-five years (1538–1583). He was brought up by the Hieronymites at Liége, and mentions having played there in the Phormio of Terence. Never did the brethren send forth one more zealous in imparting classical culture, or who more definitely conceived his work. His theory of education may serve as a standard for discrimination of later and more hybrid forms.

The end of all study, according to Sturm, is to combine piety with learning.[1] But piety being the common duty of all men, the distinctive aim of the student is to attain wisdom and eloquence, the knowledge of things, and the power to set them forth in pure and graceful words. In the order of nature words come before wisdom.[2] A student should be trained six years at home, ten at school, and five at an academy. Of the ten years eight are required for gaining purity and perspicuity, two for adding the graces of style. Readiness and skill in adapting words to things are the business of the five academical years.

Sturm conceives the means as clearly as the end. Of

[1] *Pietas literata* became a watchword of Protestant schools.
[2] "Ad loquendum homines quam ad cogitandum judicandumque promptiorem naturam habent."

ten forms, each one has its special work. The youngest boys are taught the Latin name of everything they eat, drink, see, or handle in playground, school, or church.

As they rise in the school, the quantity of Latin text read is much increased. The practice of composition is incessant. The elder boys write exercises daily. Verses are begun in the fifth; the upper forms transpose odes of Horace and Pindar into other metres, and produce poems of their own. In prose, the fifth form re-translate from German into Latin, and compare with the original. The upper forms turn Greek orators into Latin, and Latin orators into Greek, with special attention to rhythm, accent, and effect, the master of the form always showing his own version. They write themes, descriptions, and letters, and declaim with or without verbal preparation. They also make careful written translations from Thucydides and Sallust. On Sundays, they turn German catechism into Latin. The elder boys read St. Paul in Greek,[1] and learn by heart his Epistle to the Romans. They learn no Hebrew, for the Rector is of deliberate opinion that a fair command of two languages is as much as can be expected from boys of sixteen.[2]

Materials, as well as models, for the composition are furnished by constantly reading and learning by heart the best authors, and by systematic excerption of phrases and "flowers." The rules of Logic are exemplified from Demosthenes and Cicero; those of Rhetoric

[1] The exposition was to be practical. "Non considerabis quid in suis faciant commentariis theologi, sed quid Romani fecerint cum ad illos Paulus scripsisset."

[2] "Multum illum profecisse arbitror, qui ante sextum decimum ætatis annum facultatem duarum linguarum mediocrem assecutus est."

also from Homer [1] and Virgil. Latin poetry is traced to its Greek sources; and parallel passages learnt by heart, in verse and in prose. Cicero and Terence [2] are the models for Latin prose. Imitation is reduced to rule. Like theft in Sparta, it is honourable if it is not found out.[3] The jackdaw's mistake was careless arrangement of his borrowed plumes. Stolen apparel should be disguised, by addition, diminution, or alteration.[4] But Sturm does not admit that to take from Cicero is to steal. "Convey, the wise it call."

"Whose is the work of memory? Whose the skill in selection? Whose the craft in concealment? I come upon the words in Cicero's writings. I mark their value, note the place. I find an use to which they may be put: I go back to the place, transfer them, disguise them, appropriate them, 'borrow' them, if you will. Whose are they now? They have cost me more pains than they cost Cicero. Besides, Cicero does not grudge me them: did he not write for others, for all mankind?" Such, in spirit, is the German Cicero's defence of a practice which Erasmus condemned.

To gain colloquial readiness, all the boys speak Latin, even the obscure little Teutons in the dim regions [5] of the lowest forms. The masters are forbidden to address them in German. The boys are severely chastised [6] if

[1] "Credo ego, omnium oratorum ornamenta et instituta in Homero demonstrari posse, ita ut, si ars dicendi nulla extaret, ex hoc tamen fonte derivari et constitui possit."

[2] "Terentio post Ciceronem nihil utilius est. Purus est sermo et vere Latinus."

[3] "Primus conatus sit ut similitudo non appareat."

[4] "Occultandi vero modus in tribus consistit: additione, ablatione, mutatione."

[5] "Qui in extremis latent classibus."

[6] "Hæc consuetudo custodienda severitate et castigatione" (ἵν' διὰ δυοῖν).

they use their mother-tongue. On the way to and from school, and in games, they are to speak only Latin, or Greek. A first fault may be pardoned, but contumacious use of the mother-tongue is far too grave an offence.[1]

But the chief feature of the school is the theatre, in which the elder boys weekly tread the stage, and the younger boys [2] fill the benches. Had Melanchthon foreseen to what length a system of pressing Terence upon the attention of boys might be carried, his recommendation of the poet to schoolmasters would perhaps have been less urgent or more guarded. Though Sturm is careful with Horace and Catullus, his boys play all the pieces of Terence and of Plautus indiscriminately. By dividing the work, the whole repertory can be got through in six months.[3] Day after day the actors are busy conning their parts, and week after week they throw themselves, with as much histrionic effect as by imagination or drill they can attain, into the stage characters and theatrical situations which pleased and edified pagan Rome. If Plato's Republic had been among the school-books of Strasburg, the boys would have understood his remarks on the drama. Sturm was aware of the objections made, and arranged also a law court, with quæstor, jury, and public complete, in which all the forensic orations of Cicero were to be delivered once a year, the best wits of Strasburg arguing on the other side. It must be added that the two highest forms learnt a little arithmetic and Euclid and use of the

[1] "Nullus veniæ locus, si quis hic peccet petulanter."

[2] This is not expressly stated; but as Sturm was jealous of the advantage which ancient Roman boys had in attending the theatre, it is not likely that he would allow his own boys to lose opportunities.

[3] The two upper forms also represented plays of Aristophanes, Euripides, and Sophocles.

globes; and the whole school was trained in music and gymnastics.

Was this a satisfactory education in the sixteenth century? If not, wherein lay the mistake?

It will not do to answer the first question off-hand in the negative, and to set down Sturm as a pedant.[1] In the first place parents were not of that opinion; and (as a great modern journal argues) if parents are content to send their boys to a school as it is, why propose reforms? The school kept up its numbers: in Sturm's time there were several thousand pupils. It kept up its aristocratic connexion: there were two hundred boys of noble birth, twenty-four counts and barons, and three princes. It did not neglect the children of the poor; they were maintained at the public expense, or by private charity.[2] It had an European reputation: there were Poles and Portuguese, Spaniards, Danes, Italians, French, and English. But besides this, it was the model and mother-school of a numerous progeny. Sturm himself organized schools for several towns which applied to him. His disciples became organizers, rectors, and professors. In short, if Melanchthon was the instructor, Sturm was the schoolmaster of Germany.[3] Together with this method, his school-books

[1] Bacon speaks slightingly of him: "Tunc Sturmius in Cicerone oratore et Hermogene rhetore infinitam et anxiam operam consumpsit." In Hallam's opinion, "Scarce any one more contributed to the cause of letters in Germany. . . . We could, as I conceive, trace no such education in France, certainly not in England."—I. 336.

[2] "De quorum indole constat, certus numerus constituatur quibus respublica victum suppeditet: cæteri privatim a civibus conquirant necessaria."

[3] "Suo tempore communis fere scholarum per Germaniam moderator. Ejus consilia non Germaniæ tantum urbes sed peregrinæ secutæ sunt. A cujus methodo utinam non abiissent scholæ Germanicæ."—*Morhof*, vi. 1, 13; ii. 2, 19.

were spread broadcast over the land. Both were adopted by Ascham [1] in England, and by Buchanan in Scotland. Sturm himself was a great man at the imperial court. No diplomatist passed through Strasburg without stopping to converse with him. He drew a pension from the King of Denmark, another from the King of France, a third from the Queen of England, collected political information for Cardinal Granvella, and was ennobled by Charles V. He helped to negotiate peace between France and England, and was appointed to confer with a commission of cardinals on reunion of the Church. In short, Sturm knew what he was about as well as most men of his time.[2] Yet few will be disposed to accept his theory of education, even for the sixteenth century, as the best.

Wherein then lay the mistake? In what he asserts, or in what he assumes?

Sturm asserts that the proper end of school education is eloquence, or in modern phrase, a masterly command of language, and that the knowledge of things mainly belongs to a later stage. Although the "fair command of two languages" is to be turned to other account elsewhere, it is clear that at school Greek is made secondary to Latin, and Latin to the formation of style.[3] To become acquainted with the thoughts and things which are to be found in such rich variety in classical authors, is not the final end in view. Homer, Demosthenes, Thucydides, Aristophanes, Euripides, are read chiefly for their rhetoric, and as material for

[1] See his "Schoolmaster," lately reprinted; in Johnson's opinion "the best advice ever given for learning languages."

[2] His Life has been written in French by C. Schmidt.

[3] "Multa Herodotus, plura Thucydides, Zenophon nihil non habet quod sequaris."

translation into Latin.[1] Latin is not learnt to read Cicero and Terence, but Cicero and Terence are read to learn Latin.

Sturm assumes that Latin is the language in which eloquence is to be acquired. Yet he plainly declares that eloquence is not tied down to the ancient tongue. "What can be more pure and graceful than the Italian prose of Boccaccio, or what more musical than Petrarch's verse? The French have their Comines, and the Germans their Luther; a man who, if there had been no Reformation, if he had never preached, never written anything but the pure and rich German of his Bible translation, for this alone would have been immortal." Why then were German boys to neglect their mother-tongue, and spend ten years in laying the foundations of eloquence in Latin?

It is easy to divine the answer. The attainment of eloquence in one language was arduous, in more than one (at least for the majority, to whose interests a schoolmaster ought to look) impossible. A choice must be made between Latin and German. Sturm chose the common language [2] of educated Europe, and sacrificed the mother-tongue.

While classical schools were thus organized throughout Protestant Germany, Catholics on their part were not idle. Perceiving what strength Reformers derived from alliance with the ancients, and discerning the

[1] There was nothing then in German to translate, unless it were the Catechism, or Luther's Bible, or Tauler's sermons, which open German as Boccaccio's novels open Italian prose literature.

[2] "Quod in tribus divini spiritus muneribus Deus voluit ubique esse, et esse perpetuum. . . . Hæc jam in medio proposita est industriæ hominum, ut quæ velit eam suis civibus respublica recuperare possit."

true value of classical studies, if kept subordinate to the faith and interests of the Church, the Jesuits resolved to fight against heresy with the nobler weapons of education and learning, leaving to the Dominicans fire and sword. They forthwith drew up a scheme, obtained the Pope's consent, and used their utmost endeavours to secure that throughout Europe as many as possible of the rising generation might for the future be committed to their charge.

The Jesuits had special motives for making Latin the language of their schools, and judged it expedient to push the practice so far as forcibly to suppress the mother-tongues. They knew but one end, the interests of the Church; one sacred text, the Vulgate; one Breviary, the Roman; one will, their General's. So, in their schools, they would have but one spoken language, Latin; one style, that of Cicero; one theology, that of Aquinas; one philosophy, that of Aristotle, interpreted, when possible,[1] in accordance with Aquinas. All this was matter of obedience. "Read, write, speak Latin," was one rule. "Imitate Cicero" was another. An independent style might foster independent thought, which might ripen into independent action.

Every class spoke Latin, and every class read Cicero. Cicero supplied the form and often the matter of exercises in prose. Virgil stood in the same relation to verse. Christiads were written in the style of the Æneid. The classics were read in expurgated editions. Instead of setting Christian youth to act heathen plays, the Jesuits wrote dramas, in which naughty boys, ghosts, drunkards, and devils supplied the excitement necessary to please. The boys were forbidden to attend

[1] The Dominicans were furious at this qualification.

any public spectacle, unless it were to see heretics burnt.[1]

Three classes learnt grammar, the fourth humanity, and the fifth rhetoric. The study of the classics was thus directed to the formation of an eloquent style, to be used in the service of the Church. Some attention was also given to the subject-matter and to miscellaneous knowledge, under the name of "polymathy," or "erudition." Much less Greek than Latin, and no Hebrew was read in the school-work (*studia inferiora*). In the higher studies, Aristotle's Logic, Physic, Metaphysic, and Ethics, with Euclid and the use of the globes, formed the staple of liberal education. In the theological course, the exegetical lectures were on the Vulgate, with occasional reference to the Greek and Hebrew. The Hebrew lecturer chose some one of the easier books.

This well-devised system was worked by able writers of school-books and by skilful teachers. The education was gratuitous. Different measures of it were given according to the capacity of the pupils. The rapid progress made by Catholic scholars presented a striking contrast to the backward state in which they had often been kept by the mediævalism of the other religious orders. Protestants sent their sons to profit, without charge, by the zeal of the Jesuit teachers. Their reputation and their numbers grew apace. The first school was opened in 1546, six years after the foundation of the order. Before the century closed there were two hundred. They overran Germany at once, making their headquarters at Vienna, Cologne, Prague, Ingolstadt, and Munich. In France they encountered more opposition. Yet they were soon known as the best

[1] "Neque ad publica spectacula, nec ad supplicia reorum, nisi orte hæreticorum, eant."—*Ratio et Institutio Studiorum*, 170.

classical scholars in the country. The Port Royalists, a century later, were in this respect their only rivals.

Sturm regards the method of the Jesuits as bearing a close resemblance to his own. He commends them for having undertaken what neither Hegius, nor Agricola, nor Reuchlin, nor Erasmus could persuade the old religious orders even to allow, the cultivation of true eloquence and sound learning. He rejoices in their zeal, both as provoking Protestants to vigilant rivalry, and as directly carrying on the good work.

But the chief testimony in their favour is that of Bacon, who declares that he could sum up his thoughts on education by naming the Jesuit schools as the best.[1] He praises them especially for accustoming boys to act a part, which, though disreputable as a profession, is useful in life, and lauds their energy and skill in the formation of moral character, no less than in the cultivation of learning. This estimate stands in marked contrast with that of Leibnitz, who rates the Jesuits of his own time (a century later) as below mediocrity, and treats Bacon's admiration as a mistake.

VIII. In England, Greek literature had neither died out so soon, nor was so slow to revive, as in other countries.[2] The question between Latin and the mother-tongue was complicated for a time by the rival claims of Norman and Saxon, Latin being construed in grammar schools into French till about 1350.[3] The

[1] "Consule scholas Jesuitarum: nihil enim quod in usum venit his melius."

[2] See Sir George Young's Essay on the "History of Greek Literature in England."

[3] The change had its bad as well as good side. "The boys learn their grammar in less time than they were wont to do, but know no more French than knows their left heel, and that is harm to them if they shall travel in strange lands." So writes John of Trevisa, in 1387.

Norman conquest also tended to mark strongly the contrast between the gentleman and the scholar. Hallam supposes that in 1400, or a generation later, an English gentleman of the first class would usually have "a slight tincture of Latin." But about the earlier date Piers Plowman bitterly complains that every cobbler's son and beggar's brat gets book-learning, and such wretches become bishops; and lords' sons and knights crouch to them. He thinks that lords should make bishops of their own brothers' children.[1] Probably nowhere did the Christian religion do more than in England to exalt them of low degree; and nowhere were gentlemen less disposed to humble themselves to be scholars, that they might be exalted to be bishops. The universities were much frequented by the sons of yeomen; and in the monastery and cathedral schools, and large parish schools, any peasant boy of good capacity might learn Latin free of expense.

In the reign of Richard II., indeed, a petition was presented to Parliament by certain lords, praying that children of serfs and the lower sort might not be sent to school, and particularly to the schools of monasteries, wherein many were trained as ecclesiastics, and thence rose to dignities in the state.[2] But the clergy were strong enough to defend the cause of the poor. One of the most disgraceful acts for making agricultural labour compulsory ends with the proviso that "every man and woman, of what estate or condition that he be, shall be free to set their son or daughter to take learning at any manner school that pleaseth them within the realm."[3]

Gentlemen took care that their sons should learn

[1] See "Education in Early England," by F. J. Furnivall.
[2] Christian Schools and Scholars, ii. 234.
[3] 7 Hen. IV. c. 17, quoted in "Education in Early England."

"courtesy," to ride, sing, play upon the lute and virginals, perform feats of arms, dance, carve, and wait at table,[1] where they might hear the conversation (sometimes French or Latin), and study the manners of great men. In some of the great houses there were masters of grammar to teach Latin to the "young gentlemen of the household." Also many gentlemen studied at the inns of court, and some at foreign universities.

A letter from Pace to Colet, about the year 1500, shows the tone of another class of gentlemen. One is represented as breaking out at table into abuse of letters. "I swear," he says, "rather than my son should be bred a scholar, he should hang. To blow a neat blast on the horn, to understand hunting, to carry a hawk handsomely, and train it, that is what becomes the son of a gentleman: but as for book-learning, he should leave that to louts."

It is stated by a recent historian that, as late as the reign of Edward VI., there were peers of Parliament unable to read. Well might Roger Ascham exclaim, "The fault is in yourselves, ye noblemen's sons, and therefore ye deserve the greater blame, that commonly the meaner men's children come to be the wisest councillors, and greatest doers, in the weighty affairs of this realm."

The history of the classical revival at the English universities is well known, and has lately been brought before the public.[2] It may suffice to remark that almost all the Oxford leaders, Selling, Linacre, Grocyn (a Wykehamist), Colet, and Lilly, had visited Italy,

[1] Cardinal Morton used to say of Sir Thomas More, "This child here waiting at table, whosoever shall live to see it, will prove a marvellous man."

[2] In Seebohm's Oxford Reformers, and in Sir G. Young's Essay.

and were in close relations with Italian scholars; while of the Cambridge leaders, Croke (an Etonian) had taught Greek at Leipsic and at Louvain, and Smith and Cheke were men of the world, and of some European reputation.[1] The lustre of these names, and the enthusiastic flatteries of Erasmus, who found himself at home with a distinguished circle in each university, tend to conceal the fact that, for a long time, the number of classical scholars was but small. Indeed, it could not well be otherwise until some change should take place in the schools.

The two great schools founded before the revival, Winchester (1386), and Eton (1440), were on one model, being intended to lay a grammatical foundation for the studies of New College, and of King's. No record of the course of training in those days has been preserved.[2] In Wolsey's Statutes (drafted before 1477) for the Ipswich Grammar School, which was to prepare students for his college at Oxford, there is no mention of verses or of Greek.

An account of Eton in 1560 (?) shows what the school had become a quarter of a century after the appointment of Udall as head-master. The sixth form alone learn Greek grammar. The younger boys read Terence, Cicero (Sturm's selection), Vives, and Lucian in Latin. Among the books of the upper forms, besides the Ovid, Virgil, Horace, Catullus, and Martial of modern days, are Cæsar, Lucan, and the epigrams of More.

Verses are written on subjects such as might still be set in the lower forms. There is some attempt to go to

[1] Linacre was tutor to Prince Arthur at Oxford (1501), Cheke to King Edward VI. (1544). Smith was Secretary of State to Queen Elizabeth.

[2] In the Paston Letters, there are two Eton Latin verses of 1468.

nature for poetic inspiration. Before writing on "the flowery pleasantness of spring," the boys are sent out at break of day to gather branches of maythorn, taking care not to wet their feet. In "fruitbearing autumn" the plentiful crops must be imagined and described before nutting is allowed. The verse was Latin, with an exception in favour of the gaiety of spring, which was allowed to vent itself in simple English; as still, when his heart is most full, an Eton boy may bid his school farewell in the unpractised accents of his mother-tongue. The other exercises were declamations, themes, versions, and variations. Excerption of flowers and phrases was also taught in school.

Epigrammatic contests were encouraged, and the writer describes with glee how at Montem new fellows were salted with salt, with Latin gibes, and with their own tears. On the long winter nights the boys acted Latin or English plays written by Udall, "the father of English comedy." In July a competitive examination was held, that the fittest in all Britain might be elected to the college.

From this account it is plain that classical education did not leap at once into full growth. If "English boys disporting themselves in Greek epigrams" existed anywhere save in the imagination of Erasmus, it can hardly have been at Eton. But before the end of the century a contemporary writer [1] states that at Eton, Winchester, and Westminster a great number of poor scholars were "well entered in the knowledge of the Latin and Greek tongues and rules of versifying." As regards other schools, the information extant relates to what was intended rather than to what was achieved.

What was intended in cathedral schools has been set

[1] Harrison. See "Education in Early England," p. 58.

forth in Mr. Whiston's book on cathedral trusts. If the preambles of Acts were history, it would appear that at all the cathedrals founded or reformed by Henry VIII. good stipends were provided for "readers of Greek, Hebrew, and Latin." When an endeavour was made at Canterbury to exclude the children of the poor from profiting by these endowments, Cranmer made a spirited protest, concluding as follows: "The poor man will for the most part be learned when the gentleman's son will not take the pains to get it. . . . Wherefore if the gentleman's son be apt to learning, let him be admitted; if not apt, let the poor man's child that is apt enter in his room." But before long cathedral trust-moneys for the most part took another direction.

During the last thirty years before the Reformation there were more grammar schools erected and endowed in England than had been established in three hundred years preceding. These were results of the recovery from the Wars of the Roses, and of the classical revival, which had nowhere more influence than at court. The king himself was learned in the tongues, and took care that his family should be so. Erasmus praises the learning of Queen Catharine and the Latin letters of Mary. Ascham read Aristotle's Ethics in Greek with Edward, and made him translate from Cicero into Greek. Of Elizabeth's Greek he writes to Sturm in the highest terms. Lady Jane Grey, Lady Cecil, Lady Russell, and More's daughter Margaret are examples of the classical scholarship attained, so far as hawking and hunting permitted, in families connected with the court.

The Reformation greatly diminished the amount of education by the destruction of religious schools. It became necessary "to take diverse orders for the main

tenance and continuance of scholars, priests, and curates," which led to the foundation of more grammar schools. But the rapacity of Edward's council left scanty funds to endow them. The reign of Mary was disastrous to education. The general want of schools, decay of the universities, and decay of learning were represented to Elizabeth [1] in the strongest terms. But, except by private liberality, little was done to meet the want.

The statutes of the grammar schools or free schools founded by the Crown and by private benefactors are nearly all on one model, combining classical with religious instruction. The archetype may be found in Dean Colet's Statues (1509) for St. Paul's. Scholastic Latin was to be strictly excluded, but not so Christian writers in good Latin. The head-master was to be "learned in good and clean Latin literature, and also in Greek, if such may be gotten." Such was gotten, in the person of Lilly, the author of *Propria quæ maribus* and *As in præsenti*. Erasmus, who had been much consulted in the whole matter, and helped to draw up the grammar, considered this school to be the best in England.

The statutes of the school founded at Manchester (1525) by Bishop Oldham may serve further to set forth the conception of a grammar school. He had observed that "the children in the same country having pregnant wits had been most part brought up rudely and idly," and determined to give them an opportunity of learning grammar, as being "the ground and fountain of all the other arts and sciences . . . the gate by the

[1] Strype's Annals, i. 437. "At the beginning of her reign but few of the clergy had the least tincture of Greek learning, and the majority did not understand Latin."—*Hallam*.

which all other been learned and known in diversity of tongues and speeches." There is no special mention of Greek.

The Shrewsbury Grammar School, founded by Edward VI. (1551), is described by Camden as "the best filled in all England, being indebted for its flourishing state to provision made by the excellent and worthy Thomas Ashton." Ten years later, Laurence Sheriff made similar provision for Rugby. Harrow was founded (1571) as "the Free Grammar School of John Lyon." He names for use many of the best Latin and Greek books, but only one Greek poet, Hesiod. The boys are "to be initiated in the elements of Latin versification very early." And "no girls shall be received to be taught in the same school." The headmaster "may take of the foreigners such stipends and wages as he can get, so that he take pains with all indifferently, as well of poor as of rich."

The statutes of the later free schools generally prescribe verses, and Greek. Archbishop Grindal, for example, requires for St. Bees (1583) "a meet and learned person that can make Greek and Latin verses, and interpret the Greek Grammar and other Greek authors." The only other Greek author named is "the little Greek Catechism set forth by public authority." Archbishop Sandys expects from the Hawkshead School, in Lancashire (1588), that "the chiefest scholars shall make orations, epistles, and verses in Latin and Greek for their exercises," and all the scholars "shall continually use the Latin tongue or the Greek tongue as they shall be able." Archbishop Harsnet wishes for Chigwell (1629), "a man skilful in the Greek and Latin tongues, a good poet. For phrase and style he is to infuse no other save Tully and Terence; and

to read the ancient and Latin poets, no novelties or conceited modern writers."

Latin plays are not much mentioned in the statutes, but were frequently acted; at Shrewsbury weekly. In a few cases Hebrew is required of the head-master, as at Bristol, Southwark (1614) and Lewisham (1652). But in by far the larger number of schools Greek and Latin alone are specified, and in some it is expressly said that "Greek and Latin only," or "the classics only," are to be taught.

Charterhouse (founded 1611) is an exception. For, although the statutes (dated 1627) prescribe "none but approved authors Greek and Latin, such as are read in the best esteemed free schools," and Latin and Greek verses every Sunday upon some part of the Second Lesson, it is added that the scholars shall be taught "to cypher and cast an account, especially those that are less capable of learning and fittest to be sent to trades."

When grammar schools have received new statutes, by Act of Parliament, there has seldom been an essential change. At Leeds, an attempt was made to introduce a more modern education. But it was decided in Chancery (1805) that "the Free School in Leeds is a free grammar school for teaching, grammatically, the learned languages, according to Dr. Johnson's definition." In general, little has been done to meet the requirements of a later age. Endowments have been wasted by the cessation of demand for free classical instruction.

It is remarked by Locke, that writing a good hand and casting accounts are seldom or never taught at grammar schools, and yet gentlemen send their younger sons there who are intended for trades, and tradesmen and farmers send their children, though they have

neither intention nor ability to make them scholars. To ask why, he says, is thought as strange as to ask why they go to church: "Custom serves for reason."

In this way, schools which have almost ceased to supply the universities, have still kept together a certain number of scholars. But in some places even custom has at last died out: the schoolmaster draws his salary, and the school stands almost empty.

To give any other than a liberal education in these free schools would be a departure from the purpose of the founders. They did not design to save the pockets of gentlemen by educating their younger sons for trade, or to enable the sons of farmers to become masters of the arts of writing and casting accounts. Their intention was to recruit the ranks of the universities and of the learned professions from among rich or poor. And to a great extent this was accomplished.

It should not be forgotten what the classical free schools scattered through England have done in times past to furnish her great men. Take only the names which meet the eye in turning over the pages of Carlisle,[1] omitting all the best-known public schools, that is, the most successful free schools, formed on the same type. From Abingdon and Norwich came Chief-Justices Holt and Coke; from Huntingdon, Cromwell; from Grantham, Newton; from Kingston, Gibbon; from Giggleswick, Paley; from Newcastle, Ridley, Akenside, Eldon, and Stowell. From other schools, now not more distinguished than these, came Wallis, and Harvey, and Jenner, and Davy; Jewel and Laud; Stillingfleet, Waterland, Barrow, and Clarke; Kennicott, Lightfoot, and Prideaux; Huskisson, Clarkson,

[1] "Endowed Grammar Schools." Published 1818.

and Wilberforce; Heber and Martyn. It would be easy to lengthen the list from other and more recent sources. One name cannot be omitted: it was at a free school that Shakespeare received a liberal education.

IX. Thus Grammar and the Classics were established, and for three centuries have been accepted in practice as constituting, with religion, the whole course of liberal school education in England. But in theory the system has not passed unquestioned.

It deserves remark that Bacon did not urge reform in school education. He contents himself with praising the Jesuits, and gleaning a few neglected truths. The friends of rhetoric, as against science at schools, are so far entitled to count him on their side. Yet his advice to bring the mind into closer contact with facts, and to work from the concrete to the abstract, led other school-reformers to insist upon the knowledge of things as well as words, and to protest against teaching abstract rules before a child knows the concrete facts of language. The truth is, that intellectual revolutions begin among grown men, and are afterwards imported into schools. Classical studies were pursued for some time before they were organized for school education. So it has been with inductive science for a much longer time: because the classics were (corruptions excepted) at the first as perfect as they are now, whereas the inductive sciences came slowly into existence. Bacon anticipated, but could not create them. Had he attempted it, boys might have been taught to disbelieve Copernicus, and to despise Gilbert. Bacon might, indeed, have recommended mathematics, the very name of which tells what the Greeks thought of their importance in education. But his own training was unfortunately

defective on that side. Moreover, Bacon (though before his age in this as in other respects) was not without a certain contempt for boys.

A generation later, Milton raised his eloquent voice to proclaim the reforming of education as "one of the greatest and noblest designs that can be thought on, and for the want whereof this nation perishes." An idea had long since in silence presented itself to him of a better and larger education. As regards learning, his first principle is, that "language is but the instrument conveying to us things useful to be known." He therefore condemns as the chief mistake at schools "a preposterous exaction, forcing the empty wits of children to compose themes, verses, and orations, which are the acts of ripest judgment." In his opinion the most rational way of learning a language is first to commit to memory the most necessary parts of grammar; next, to apply the grammar in reading the most delightful book that can be found, such as Plutarch's Lives; then to proceed forthwith to the solid things which the language contains, beginning with the easiest arts, that is, with those which are most obvious to the sense. His list of authors will seem absurd if the principle (of reading a language for its solid contents) be rejected, and out of date at the present day if it be accepted. Agriculture, physiology, architecture, astronomy, and tactics are among the subjects to be studied in Greek and Latin. Among poets he first names Hesiod and Aratus, Lucretius, "the rural part of Virgil," choice comedies, Greek, Latin, or Italian, and "tragedies that treat of household matters." Use of the globes, "any compendious method [1] of natural philosophy, mathematics, fortifica-

[1] One of Bacon's few remarks on Education is a warning against compendious methods.

tion, engineering, or navigation, anatomy, and the like are to be learnt from modern authors; geometry, "even playing, as the old manner was." Next follow ethics, economics, politics, the highest matters of theology, Church history, ancient and modern, and the Hebrew Scriptures. Then "choice histories, heroic poems, and Attic tragedies of stateliest and most regal argument, with all the famous political orations." Lastly, a course of logic, rhetoric, and poetics introduces the right season of forming the pupils to be able writers, "when they shall be thus fraught with an universal insight into things."

Although the scheme is impracticable, or, in Milton's words, "not a bow for every man to shoot in that counts himself a teacher," it shows that a great poet may be less disposed than a great philosopher to think that true command of language can be attained apart from knowledge of things.

A reformer more on a level with the public mind was Locke. In his view schools were teaching "things a great part whereof belongs not to a gentleman's calling, which is to have the knowledge of a man of business, a carriage suitable to his rank, and to be eminent and useful in his country according to his station."

He dissuades from sending a boy to school, which is "to hazard your son's innocence and virtue for a little Greek and Latin;" and advises that a tutor be procured who thinks learning and language the least part of education.

Latin, however, of a certain sort being absolutely necessary for a gentleman, he is to "have it talked into him," by conversations with the tutor on geography, astronomy, chronology, anatomy, parts of history, and the like. If such a tutor cannot be found, the boy must

learn by literal translations. Or his mother, without any previous knowledge,[1] may read with him a Latin gospel. Indeed, such Latin as Locke desires "might be learned almost in playing." Those who wish to be critically exact must study grammar. But ladies speak correctly without it. The only grammar which a gentleman needs is that of his own tongue, which alone he means to write. "And let him read those things that are well writ in English, to perfect his style in the purity of our language."

If the boy is sent to school, the master will want to teach him grammar. Locke advises the parent to explain "that you have no design to make him either a Latin orator or a poet, but barely would have him understand perfectly a Latin author."

As for verses, a boy has not, or he has, a natural turn for them. If he has not, you cannot give it him; if he has, the sooner it is suppressed the better. Such a taste will lead him into bad company and bad habits.

No man can pass for a scholar who is ignorant of Greek. But the question in hand is the education of a gentleman; to whom Latin and French, as the world goes, are by every one acknowledged to be necessary. When he comes to be a man, he can easily get Greek for himself.

As soon as a boy can talk, French should be "talked into him." Mathematics may also be useful. Locke himself knew a young gentleman who could demonstrate several propositions in Euclid before he was thirteen. "Natural philosophy as a speculative science" (says Locke) "I imagine we have none. . . . Yet the in-

[1] The *méthode maternelle* is in common use in French commercial schools. But a mother is supposed to know the language which she teaches.

comparable Mr. Newton has shown how far mathematics applied to nature may carry us in some particular branches of this incomprehensible universe. If others could give us so good and clear an account of other parts of nature, as he has of this our planetary world," the subject might become a proper part of a gentleman's education.

Locke's views resemble those of Montaigne, who wrote in the previous century. Montaigne's father had actually brought him up as a child to speak Latin only. But in Locke's time it was no easy matter for English gentlemen to do the like, Latin being then, in his own words, "a language foreign in their country, and long since dead everywhere." Montaigne had also learnt Greek (not much) from his father "almost in playing." He thought children's wits were none the sharper for dry rules of logic or grammar. "Magis magnos clericos non sunt magis magnos sapientes."

X. Theories, however, are of little weight as compared with experience. And for experience of any but the one-sided classical course of liberal education it is necessary to look beyond England.

In Germany, the first reformer of classical education was Ratich, who professed to have a system by which Hebrew, Greek, Latin, and other languages, might be learnt in a very short time. Dissatisfaction with existing education led several towns to employ him to organize their schools. The chief points of his method were to begin with the mother-tongue, to teach a language first and the grammar afterwards, to let nothing be learned by heart, but impress a lesson by frequent repetition, and the like. He saw the weak points of existing schools, but was not competent to reform them. He ended by being thrown into prison,

and was only let out on signing a paper to the effect that he had promised more than he could perform.

A more successful reformer was Comenius (1592–1669), whose *Janua Linguarum* and *Orbis Pictus* obtained great celebrity and circulation. The latter was intended to combine a large and not exclusively classical Latin vocabulary with knowledge of things. He was led by reading Bacon to insist upon the latter. He held that all ranks should receive the same education, and that only two languages, the mother-tongue and Latin, should be carried to all possible perfection. He expected to see Latin become an universal language, not only for Europe, but for the world.

In the seventeenth century the Germans were learned rather than elegant scholars. But the Thirty Years' War brought down the standard so low that, after a short struggle to restore it, early in the eighteenth century Latin began to be laid aside as a spoken language at German universities and schools. Germans of rank would often desire that their sons should give up Greek to devote more time to French, which seemed about to become the common tongue of Europe. And little as the German language had then done in literature, there were rectors who held that it had its classical authors, and ought to be studied as carefully as the other tongues.

The cry of "Things, not words," gathered strength, and useful was opposed to liberal education. It was thought that boys intended for trade were out of place in the classical schools (Verbalschulen). The first Realschule was opened by Semler, at Halle, in 1739. At Berlin (1747) a Realschule, with a classical department, was founded, in which a liberal education might be combined with the study of any special subject,

such as "breeding silkworms," or "ninety kinds of leather."

Rousseau's "Emile" (1762) stimulated the reaction in Germany against classical education, and led to the foundation of schools, of which a chief feature was Latin without the rod;[1] such as Basedow's "Philanthropin," at Dressau (1774), and later, the schools of Pestalozzi. Kant recommended and collected money for the former, and Fichte supported the latter. In Kant's opinion, "not slow reform, but swift revolution" was needed in schools. At the Philanthropin Greek was not taught at all, and Latin badly. Kant afterwards acknowledged it to be a failure, but thought the experience worth what it had cost. The Prussian minister, Zedlitz, at first believed in Basedow.

But Frederick II., being disposed to favour the classics,[2] Zedlitz appointed F. A. Wolf to be Professor of Philosophy and Education at Halle, in place of a disciple of Basedow, for whom the Chair had been founded. Wolf held the post twenty-three years (1783–1806), and educated some of the most distinguished German scholars, among others, Böckh, Bekker, and Heindorf; Halle having till then been under the reproach of producing no philologian. He accomplished this by founding a seminary for training professed scholars, many of whom became teachers at the classical schools. Insisting on thoroughness in everything, he opposed the introduction of miscellaneous knowledge. An ideal floated before him of making Greek, not Latin, the first language taught to boys. He believed that this was the

[1] Generally, Latin and rod were nail and hammer. For this reason Latin could only be taught to boys.

[2] "Lateinisch müssen die jungen Leute absolut lernen; davon gehe ich nicht ab."

right means to promote the highest culture of the German mind. But the whole current of the time was against him, and he gave it up as a beautiful dream. Practically, he advised that Greek and Hebrew should be taught only to those who showed special aptitude for language.

The experience of Austria [1] in liberal education is instructive. For more than two centuries (1550–1773) the Jesuits, Benedictines, and Piarists had almost a monopoly, the last-named order inclining to "things, not words." The Jesuits also taught natural science and mathematics, but failed to give efficient instruction. General dissatisfaction arose, and complaints were made that they loaded the memory without training the mind, taught poor Latin and no German, adhered to a course of study long since out of date, and objected to State control. Maria Theresa (1760) took vigorously in hand the general reorganization of schools. Cardinal Migazzi declared that the once glorious educational exertions and successes of the Order of Jesus had had their time, and like all things human, their schools had fallen into decay. Clement XIV. simplified things by abolishing the Order. A brilliant period followed, in which Austria took the lead in German popular education. Funds and buildings of classical schools were appropriated for normal and primary schools for both sexes; Maria Theresa's son, the future Emperor Joseph II., being of opinion that when all her subjects could read, write, and cypher, then would be the time to attend to learned education. The Empress, the aristocracy, and the great ecclesiastics assisted liberally from their private means. No more Latin

[1] "Fortschritte des Unterrichtswesens," by Beer and Hochegger, 1867.

was to be learned in these schools than was necessary for apothecaries, surgeons, and scribes, and to prepare for classical schools. But liberal education was not neglected. A scheme was drawn up by Professor Hess (1774), rejecting mediæval books, encouraging Greek and classical Latin, but requiring also the systematic study of German and the other mother-tongues, and insisting on mathematics and natural science. In favour of this reform, he appealed to the satisfactory experience of Saxony, Hanover, and Würtemberg.

The first difficulty was to find efficient teachers. The Piarists had their own ways of teaching "things, not words." And rather than employ Protestants, Austria fell back on the ex-Jesuits. Between the two, physical science had no fair trial. The new liberal education began to look like a failure; which distressed Joseph more than it distressed the Jesuits.

The death of Joseph (1790), the terror spread by the French Revolution, and the accession of Francis II. brought about reaction. The professed principles of reform were not ill-sounding. Superficial studies were to be banished, physical science relegated to the philosophical course, and it was laid down that in liberal school education the proper study of mankind is man. Instruction in the German language and literature was to be retained. The clergy were to see that all this was done.

The year of another French Revolution (1848) brought another crisis. Plans of reform had long been under discussion: but in that year Austria first reached the stage of having a Minister of Public Instruction. Professor Bonitz, who was employed to reorganize the Gymnasia, defined it as the aim of liberal school education to impart a higher general culture, making such

substantial use of classical literature as to lay the foundation for University studies.

This conception of a "higher general culture," developed by the course of history, and recognized by all the educated nations of Europe, must determine the relation between the discipline of language and history, and the discipline of mathematics and natural science. Neither of these, considered as an independent force, can give the right movement to liberal education, the direction of which should not be determined by the classical languages alone, nor by these combined with the mother-tongue, but should result from the reciprocal and common action of all the higher studies. Bonitz regarded the application of this culture in its completeness by a single set of class teachers as "a didactic impossibility." On the other hand, he saw the danger of breaking up education into too many departments. His practical solution was to group kindred subjects. He insisted on previous examination of the teacher as essential to success; and a training college was founded at Vienna.

But this promising system of education was loudly denounced by the bureaucracy and aristocracy, the Catholic and some Protestant clergy, and the extreme national party. It was revolutionary, irreligious, outlandish, Prussian. It gave to Greek, the favourite tongue of Reformers, and German, a language in which Protestants were strong, an advantage over Latin, the language of the Catholic Church. The natural sciences would introduce the leaven of materialism; the severe examinations would fill the pulpits and tribunals with hard-working children of the poor. No person of rank or fortune would subject his son to such danger and such annoyance. With these complaints were mingled

outcries from the non-German populations against an attempt to Germanize their children through the schools. The system had not elasticity enough for the diversity of language and civilization in a polyglot empire.

For five years, however (1850–1855), it flourished, and proved itself to be no mere ideal. Then a Concordat threw education back into the hands of the clergy. The aid of Jesuit teachers was accepted again on their own terms, without the indispensable check of examination. The other religious orders claimed the same exemptions. Except for laymen, tests of efficient teaching were at an end. In this state the liberal education of Austria remains, a comprehensive scheme administered under narrow clerical influence.

In Germany generally, no one who has not studied at an university can enter the higher civil service.[1] There are 58 universities, with 18,971 students. No one can matriculate without a certificate of fitness from his school. The number of Gymnasia, including those of German Austria, is 520, with 114,545 pupils;[2] besides preparatory schools (Progymnasia) in the smaller towns. The classical masters teach also the German language and literature, and sometimes French and English. For mathematics and natural science there are special masters. In some schools an hour a week is given to speaking Latin. Oral translations into Latin and Greek are practised, as well as written themes and versions, and Latin and Greek verse. Hebrew is

[1] See Dr. Minssen's Report (1866) to the French Minister of Instruction; and (for Prussia) Mr. Bernard's Appendix to the Report on Public Schools; also Wiese, "Das höhere Schulwesen in Preussen."

[2] The number of boys in the Prussian Gymnasia was doubled in twenty years (1840–1860).

optional, except for theological students, for whom the course includes composition in Hebrew prose.

The final examination (Maturitäts-prüfung) in Prussia occupies a week. The papers are a German essay, a Latin essay, and Mathematics (five hours for each), a Latin version, a simple Greek version, and translation from French. An oral examination follows, in Greek and Latin poetry previously but not lately read, and in unseen prose, with Latin questions and answers; also in Religion, in Mathematics, and in History. The essays are on subjects suited for boys, and means are taken to discourage "cram."

XI. The University of Paris did not lose its mediæval character till the Revolution. Francis I., "the father of French literature," had founded (1531) a Royal College, with professors of "the three principal tongues." And among the restorers of ancient, especially of Greek learning, the great names of Budæus, Turnebus, Stephanus, Scaliger, and Casaubon belong to France. But in Paris, the new studies were opposed by the old religious orders. The Jesuits, to the best of their power, maintained the cause of classical education and learning, and were long supported by the Bourbon court. Yet the scholastic theologians and the Gallican party finally prevailed. After some vicissitudes, in 1762 the order was abolished, and their colleges handed over to the University.

But throughout the provinces, from the first to last, education flourished in their hands. They established themselves even in towns of less than 5,000 souls: and the tradespeople, great and small, finding good free schools at their doors, sent their children to learn whatever was taught there. The knowledge of Latin thus became for three centuries in France the mark of social

standing as a townsman.[1] Together with Latin, the Jesuits took care to inculcate Church principles and Catholic doctrine. Yet it was in their schools that large numbers of the people acquired intelligence to take part in the religious reforms of the sixteenth and seventeenth, and the philosophical and social movement of the eighteenth century. One of their most brilliant disciples was Voltaire.

In the Revolution, education, like all other things, was wildly tossed upon the waves of change. Each successive government, every party, clerical or secular, reactionary or progressive, saw and acted on the principle that in education lies the making of the future.[2] Notwithstanding undue predominance of political aims, much may be learned from the experience of France, for nowhere have more distinguished men taken in hand the organization of schools.

The Constituent Assembly entrusted the task to Talleyrand, who declared against exclusive classical education, as failing to train the whole mind. He considered that the best example of logical thought, and the best exercise for the reasoning powers, were to be found in mathematics, especially when studied in combination with the first principles of natural science. He proposed to strengthen the memory by history, and to stimulate the imagination by oratory, poetry, music, and drawing. Morality was to be placed on grounds of reason, virtue being taught as a science, and recommended as an advantageous calculation. His measures never took effect.

The Legislative Assembly employed Condorcet, who

[1] "Le cachet de las bourgeoisie."—*Cournot.*

[2] See "Fortschritte des Unterrichtswesens;" and About, "Le Progrès."

advised that mathematics and natural science should altogether supersede the classics; of which a superficial study was worthless, and a long and profound study pernicious rather than useful. His plan also came to nothing. The Convention accomplished little; and the Directory less.

Napoleon, as first Consul, laid the foundations of the present system. The Lycées, corresponding to the German Gymnasia, were organized on the principle that liberal education has two factors, literary culture and the discipline of exact science. The one was represented by Latin, the other by mathematics;[1] further subjects of instruction, such as Greek and history, and logic and natural science, being regarded as supplementary to these. Inspectors were appointed, and the preparation of school-books entrusted to able hands. To secure an efficient staff of teachers, Napoleon reorganized the Normal School of the Convention, in two departments, of Literature and of Science, and instituted competitive examinations for the appointments. He also (1806) established the University as an independent corporation charged with the supervision of education throughout the country, meaning thus to create a bulwark against destructive theories and incessant change.

The Restoration abolished the Normal School, and was laying the axe to the root of University independence, when Napoleon returned from Elba. Some years later the state obtained control by making the Minister of Public Instruction Grand Master of the University.

The government of Louis Philippe, under Guizot, on

[1] "On enseignera essentiellement dans les lycées le Latin et les mathématiques." (Decree of 10 Dec. 1802.)

Cousin's recommendation, reformed primary education after the Prussian model, introducing the elements of natural science. But when it came to reorganizing secondary education, warm debates arose in the Chamber of Deputies (1835–36) on the comparative claims of literature and of science, of dead and of living tongues. It was argued against the classics, not only that they are practically useless for purposes of agriculture, trade, and the like, but also that some of the most distinguished literary men of France had known little Latin, and less Greek.[1] The interests of the classics were eloquently defended by Guizot and Saint-Marc Girardin. But perhaps the most remarkable speech was the reply called forth from Arago by the shallow assertion that there is no humanizing principle in exact science.

The practical question was complicated by the fact that the Chamber was dealing at once with the interests of liberal and of commercial education, there being no proper organization for the latter.

Secondary education in France was mainly directed to the attainment of the *baccalauréat ès lettres*,[2] which confers the privileges of a first degree in that faculty, whereas the German certificate only entitles to matriculation. By new regulations in 1840, the test was made more severe, the candidate being shut up for two hours, with a dictionary, to translate from Latin, and then examined orally for three quarters of an hour in explanation of Latin, Greek, and French authors, and in philosophy, literature, history, mathematics, and physics. The questions were drawn from bags

[1] Racine and Boileau were Greek scholars; Corneille, Voltaire, Montesquieu, and Buffon, were not.

[2] The *baccalauréat ès sciences* was not established till 1852.

containing fifty on each subject, and, to render the work of preparation more definite, were published beforehand by the examiners, and (with answers) by private enterprise.

A longer and more searching examination was instituted for the title of licentiate in letters or in the sciences, at the Normal School, which was also re-organized by the government of Louis Philippe. With this part of their work they were so well satisfied, that Cousin recommended it as a model to the Prussians, who, however, preferred their own system.

In lay schools for liberal education licentiates only could be teachers. Whether this should be enforced on religious schools also, at least if they were to educate laymen, was one of the most difficult questions with which Guizot had to deal. The clergy were indignant at the notion that the soundness and efficiency of their teaching, and especially of their scientific teaching, should be submitted to the judgment of laymen. Laymen, on the other hand, insisted on the rights of the University and of the State, and on the interests of solid learning and scientific truth. In the midst of the debate came the Revolution, which has left the clergy free.

In the later educational experience of France, perhaps nothing is more likely to be instructive to England than the episode of Bifurcation (1854–1864).

The system was a compromise between two conflicting tendencies. On the one hand, there was a great and growing demand for useful, and especially for mathematical and scientific education, not only among the industrial and mercantile classes, but among candidates for admission to the civil and military technical schools. On the other hand, Latin at least having always been deemed essential in middle-class education, there was

great unwillingness that a considerable section of society should be withdrawn from the humanizing influence of classical literature.

Under the pressure of these opposite forces, Fortoul, then Minister of Public Instruction, departed from the fundamental principle of liberal education laid down by Napoleon, the intimate union of literature and science. The students were divided into Humanists and Realists. During the first five years they were to be educated together; during the last four they were to be in separate sections; working together, however, in French classics and composition, Latin translation, rhetoric, history, modern languages, and part of their philosophy. The Humanists were to be excused from higher mathematics and higher physics; the Realists in part from philosophy and Latin, and entirely from Greek. Latin and Greek were also to begin no longer in the first and second, but in the second and third years, and French grammar to be learnt before Latin.

After three years' experience, it was thought better to begin Latin and Greek grammar as early as before, and to put Latin composition later in the course. After another two years, it was found necessary to separate as far as possible all the literary work of the two sections, the Realists being a drag upon the Humanists. In the ninth year, a new minister (Duruy) condemned severely the loose mathematics of the Humanists, and decreed that the two sections should work together in both mathematics and literature for six instead of five years; and separately in both during their last three years, though learning under the same roof. Four months later he abolished Bifurcation.

How then does he meet the practical demands which drove his predecessor to the adoption of this system?

The answer, as regards liberal education, may be found in his instructions and circular dated in March, 1865. The general course has been arranged with more regard to science than hitherto, so that while the mind is enlarged by literary studies, the judgment may be strengthened by severer method. And mathematical courses have been added, in which a student, after completing the general course, may be prepared in one year for the ordinary Military School of St. Cyr, or in two years for the Polytechnic School, which qualifies for staff appointments. Non-liberal secondary education, (*enseignement secondaire professionnel*) has been separately organized.

M. Cournot, formerly inspector general of studies, writing in 1864, thought a greater sacrifice necessary to save classical education. He states that Professors of Greek literature in their French lectures dare not quote Greek, and recommends throwing overboard not only Greek composition (which would not lighten the vessel much), but Greek altogether, except the "dose" prescribed by the ancient University of Paris, which was such that a few Greek words should not arrest a French reader. He proposes to substitute German (which has grammar as well as literature) rather than English. He abandons also Latin verse, and even unwillingly parts with Latin essays, except for the grand prize at the "Concours général des lycées," at Paris, and perhaps as a "spécialité humaniste" in great provincial schools. It remains to be seen whether Government can maintain classical education at a higher level in France.

XII. While in Germany and in France three centuries have wrought these reforms, in England there has been but little change. The method indeed of classical

education has been improved, and the standard raised. Better dictionaries and editions have smoothed the learner's path. Nine head-masters have agreed upon the simplest form in which the abstract rules of the Latin tongue can be taught to children. The study of great poets, and orators, and historians, is not made so much an exercise of rhetoric or of grammar. Less regard is paid to figures, flowers, and phrases; and more to feelings, thoughts, and things. But Milton would still find verses and themes "wrung from poor striplings,[1] like blood out of the nose, or the plucking of untimely fruit." And it is still necessary to ask ourselves these questions:—Are the classics read to learn Greek and Latin, or are Greek and Latin learnt to read the classics? Is the end in view to write Greek and Latin, or to read them, and write the mother-tongue? Are learning Greek and Latin grammar and no English grammar, reading Greek and Latin authors and no English authors, and writing Greek and Latin exercises and no English exercises, the best means to form an English style? Are the French and Germans wrong in teaching French and German otherwise, or are their mother-tongues less nearly related to Greek and Latin? Or are our language and literature less worthy to receive attention than theirs?

Although the great English schools do not yet teach English, something has been added to the old purely classical course. Mathematics, and in some schools modern languages,[2] have recently become part of the school-work.

[1] Not always the striplings who show them up as their own.

[2] The study of modern languages was much encouraged at Eton by the judicious liberality of the late Prince Consort, and the support of the head-master. At Rugby, Dr. Arnold made the change.

Besides this, the Report of the Public Schools Commission, while decidedly supporting classical education, recommended that two hours in the week of school-work should be given to natural science, and the same to music or drawing. And several schools have been found willing to try the science.

But the schools generally say that in these matters they are not independent, and that they must look very much to the Universities. Two-thirds of their boys, it is true, will not go to college. And modern subjects are recognized in the civil, military, and naval examinations, by success in which honour and advancement may be obtained. For manufacture, also, science is in request; as modern languages are for commerce. But "it ought to be the aim of the public schools to give an education of the best kind, not of the second best." And the best kind of education must be defined by the Universities, which train the masters and dispense the chief endowments. Do the Universities, then, insufficiently reward natural science, and modern history and languages, especially English?

To begin with the last. At Oxford,[1] the Chancellor's, the Arnold, the Stanhope, and the two Theological Essay prizes are high distinctions, bestowed upon able treatment of subjects in English prose. There are also prizes for English verse. And in examinations for scholarships, fellowships, or university honours (except in mathematics and perhaps in natural science), a good English style conduces greatly to success. So far,

[1] Cambridge studies are discussed in another essay. [That printed in the volume entitled "Essays on a Liberal Education" (London: Macmillan, 1867), and written by the late Prof. Henry Sidgwick. It is called "The Theory of Classical Education."—Ed.].

Oxford must reject the blame for discouraging the study of English at schools. It is otherwise with matriculations and pass-examinations. No English composition is required, and if bad spelling, bad grammar, and bad style in English translations were taken into strict account, the number of failures would be much increased.

Modern languages are encouraged by free lectures, and by university scholarships. Several names are usually published for honour, together with those of the successful candidates. The examiners for Modern History honours also give weight to knowledge of foreign historians in their own tongue. But the University has hitherto declined to make modern languages a substantial part of the examination. And the colleges do nothing to teach, require, or reward this kind of knowledge.

Modern History is fully recognized, and obtains distinction and endowments. It is also in high favour with passmen as a means of getting their degree. No study has done more to bring out latent ability where classical tutors expected nothing of the kind.

The Natural Sciences have a good staff of professors, a museum and library, and an honour-list of their own, with such crumbs of endowment as may fall from the richly furnished tables of the classics. But narrow classical scholars have been disposed to regard the new studies with indifference, if not with jealousy. Nay, in some quarters there is the same mistrust of natural science as there used to be of Greek, lest it should disturb foregone conclusions.

An indictment also lies against Oxford for the

discouragement of elementary mathematics in general education.[1]

Lastly, what kind of classical knowledge is encouraged at Oxford, and what amount is absolutely required? As regards candidates for honours, the answer is satisfactory. A large and thorough knowledge of the masterpieces of ancient poetry, and eloquence, and history, and thought,—the language being held in due subordination to the subject-matter,—earns the highest distinctions and the richest endowments. And a comparison of the class-lists with any of leading statesmen in or out of Parliament, will show that this training, especially when combined with mathematics, is not unserviceable in public life. But even in classics very little is required from the many, and one of the chief problems which has lately exercised the mind of Oxford has been to convert passmen into classmen.

This has been partially solved by releasing them after two years from general education, if they will obtain honours in any special subject. But the last general examination in the second year, instead of being carefully arranged, is, for the present, huddled into the hands of persons appointed for another purpose, who require nothing more than correct translation. A state of things so contrary to the sound tradition of Oxford cannot long remain unchanged.

But the time has arrived for taking a broader view of the whole question. The country possesses already the Reports of Commissions on University Education, on the Public Schools, and on Primary Education in England and in Scotland. The series is now about to be closed by the publication of the Report on Middle-

[1] See a Letter to the Vice-Chancellor, by T. D. Acland, Esq. M.P.

class Schools. The data will then be complete for the great problem of organizing English National Education. If the Universities are equal to their duties, it is upon them that the noblest part of the task must devolve.

The free schools, which will occupy a prominent place in the forthcoming Report, were founded expressly to give a liberal, then conceived as a classical, education. It will be a duty of the Universities to see that, if possible, the endowments be not diverted from this purpose. With other schools in which modern languages and natural science are as fully recognized as the classics, the Universities have now for ten years spontaneously maintained a friendly connexion, by the Local Examinations. The title "Associate in Arts" implies that Oxford accepts education given in these schools as liberal. Balliol College, in the present year, has set the example of offering assistance and special facilities for the University education of the most successful candidates.

It may be thought that with primary schools at least the Universities can have no relations. But at Edinburgh, in the session 1865–66, of the students in the humanity classes, twenty-nine per cent. came direct from primary schools. And at Aberdeen, in the bursary competition of 1865, forty-three per cent. of the candidates mentioned in the Order of Merit had been first educated in parochial schools. A difficult question arises between liberal education in parish schools, and the requirements of the Revised Code. The Scottish Universities will take care that it be not solved by extinction of the liberal education in Scotland. But let the English Universities consider whether, with improved primary education, a similar question may not arise in England; whether there ought not to be, as of

old, a ladder, by which a boy of rare intellectual powers may climb from his parish school to an university education.

A change in the school and university course also touches the question of liberal education for women. The sacred precincts of the classics have been tabooed against such intruders as Lady Jane Grey. But they are admitted to modern studies. Sometimes in natural science, and often in modern languages, history, and literature, girls now know more than their brothers. For them, then, as well as for their brothers, instruction must be made more thorough. The most narrow mind cannot deny that what they learn at all they should learn well.

Again, the cry is raised that material interests of England are in danger, from national neglect of science in education. At present wealthy manufacturers and merchants are much disposed to send their sons to the best liberal schools, though not to the Universities, if they are intended for trade. But if liberal schools will not teach modern subjects, and if the Universities will not fully recognize their importance, there is a risk in such quarters as these of losing liberal education altogether. Nor is England so short of material wealth and so over-stocked with liberal education that she can afford to run this risk.

Thus in many ways the question of the "course" of liberal education has a most important bearing on a larger question, which, if the Universities do not boldly face it, may be settled for them by a Reformed Parliament. If the Universities and the Church mean to remain national, they must do as the Legislature has done. They must open their eyes to see the true dimensions of a nation.

There is no reason to consider the matter otherwise than deliberately and calmly, but there is reason to consider it promptly, for the Report on Middle-Class Schools will require immediate legislation.

There is reason also to consider it profoundly. For the present relations between religion and critical scholarship, and between religion and science, are not such as can be safely left to a few learned and still fewer scientific men.

The time has come again (if it ever passed away) when the knowledge of tongues is of importance for the maintenance of sound religion. Much of our embarrassment in Biblical criticism is due to our ignorance of Hebrew and German. For Latin as a common language has died out, and German has now for a long time been the tongue in which all questions relating to antiquity are discussed with most research and learning. Nor does this only touch the clergy. Laymen ought to look into these questions for themselves.

The time also has come to deal with the misunderstandings between education and science, and between religion and science. The professors must look through the telescope of Galileo. This also concerns laymen as well as clergy. At present what Erasmus said of the scholars of his time is in effect what scientific men [1] say of our classical scholars: *Incredibile quam nihil intelligat litteratorum vulgus.*

The time has come, and it need not be doubted that our ancient Universities will prove themselves equal to this modern duty. If only their attention is fully directed to the question, if they view it in its broader aspect, if they look perhaps a little to what has been

[1] See especially a paper "Observations on Mental Education," by Mr. Faraday, (reprinted in "Science and Education," Heineman, 1917 ed.).

done in other countries, and then resolve what they will do themselves, there is reason to expect that their decision will be wise, and will be wise in time. But they have before them no less a problem than to organize National Liberal Education.

CHAPTER III

ON TEACHING BY MEANS OF GRAMMAR

BY E. E. BOWEN, M.A.

It may be useful to all persons who are disposed to take a conservative view of any disputed question, to point out that one of two charges may on all occasions be brought against an argument for reform. All topics, except metaphysical ones, have a theoretical and a practical side; and a writer cannot easily discuss both at one and the same time. Nothing then can be simpler than to urge in favour of an existing system, that the theoretical objections to it are not practical, and that the practical objections are not profound. But it is sometimes forgotten that a system may be bad both in theory and in practice at once; or, which is another way of stating the case, the way in which it is worked may be wrong, and the reasons for establishing it at all may be wrong also. Those who desire in great measure to remodel English education have, for the most part, views not only as to the substance but as to the manner of teaching; and these views are fairly separable. The present Essay will relate almost entirely to method. It will assume that other things have at least as much right as the classical languages to form the basis of modern training, and that it is desirable nevertheless that at some age and to some persons classics should still be taught. The question which it will discuss is whether

the mode of teaching classics by a laborious preliminary instruction in Grammar is the best mode possible.

Pedantry is not only the commonest vice, and the worst vice, of schoolmasters, but it is one towards which every one who has engaged in the work of teaching must have repeatedly been conscious of a tendency. The work of every profession no doubt takes an undue importance in the eyes of men who devote themselves to it laboriously: but that of a teacher is peculiarly favourable to the development of crotchets. Let a clever man study assiduously the properties of a Greek particle or the ramifications of a theorem in mathematics, and he will be sure to find out some things which have not been found out before, to trace connexions which no one has yet thought of tracing, to illuminate his subject by the relation which he will find it bear to other branches of knowledge. There may be much good in what he does: but he will be more than human if he can help regarding his work as exceptionally interesting and valuable. He will find it fill much of his mind, and thrust itself in front of other branches of study which in reality have equal value: he will give to it a natural emphasis in his own thoughts, and an artificial prominence in the culture which he urges upon others. A kind of paternal solicitude will at any rate add weight to his favourite topic, and personal vanity will not impossibly help it. Now in most other professions a man deals with his equals, sees things in constant varying lights, rubs off his intellectual as well as his social angles. But a teacher is without his advantage. He is not under immediate control; public opinion acts upon him only indirectly and at a long interval of time; he is not at the mercy of those with whom he is brought into contact, and his results

are seldom so patent that the connexion of cause and effect can be traced with much precision. There arises as the consequence of this a fixed impression that his own work is the best possible, simply because it has been the most fruitful to himself; an impression not so much irrational as unreasoning. The belief is not necessarily untrue, but the chances are greatly against it. At any rate it can hardly fail to be narrow and illiberal. Ask a disciple of Porson whether it is really the case that the chief object of examining the language of the classical writers is that one may know what the writers have got to say, and he will admit the proposition with so many limitations and modifications as to make it obvious that he hardly admits it at all.

It is quite certain, indeed, that the object which is now intended in the teaching of Latin and Greek must be different from what it was in the days of Queen Elizabeth. At that time, schools and universities made boys learn those languages in order that they might have some acquaintance with the authors who wrote in them. No sane man can assert that the same object is pursued at present, unless he is prepared to allow that it is sought at the avowed cost of sacrificing the many to the few. It is the evident failure to carry out the original intention of classical studies, which has made it necessary to bring more prominently forward the supposed advantages of grammar. If boys, it is felt, cannot in general be brought to get any good from the thoughts of Plato and Homer by their study of the tongue in which they wrote, at all events they will have the advantage of studying the words and constructions which they used. Without altogether denying the truth of this assertion, it is well to remember the position which it takes in the argument. No pleas are

more open to suspicion than those which are urged in support of a falling cause. When we have to invent some new doctrine to prop up an institution which originally existed in virtue of a doctrine wholly different, we feel that we are treading at once on treacherous ground. The view that is promulgated may have its merits, but they are not generally found to be the precise merits which suffice to bear up the fabric. When paganism was seen to be untrue, it was said that at all events it was useful. When rotten boroughs were found to interfere with the representation of the country, it was pleaded that at any rate they produced Lord Macaulay. As regards the teaching of Grammar, it sometimes seems as if it would be good a thing to attempt to express distinctly, after the manner of Mr. Charles Buxton in his "Ideas of the Day," the grounds upon which it is based in the minds of those who assert its importance. They seem to fall under three heads: there is the idea that Grammar is useful for the sake of teaching the language; the idea that its difficulties are useful as a moral training; and the idea that it is a desirable object of study for its own sake. We may consider these as being the only ideas generally entertained; for the view, which was expressed last year in a pamphlet by an eminent composer of a School Grammar, to the effect that Grammar and Religion are so closely connected that uniformity in the one is the first step to uniformity in the other, has not been accepted so widely that we need stop to discuss it here. The ideas just mentioned we may proceed to consider in detail.

I. The first of them we will meet with a direct negative. By Grammar is, of course, meant a formal analysis of usage, in respect of inflexion and syntax.

Can it be said that this system of teaching by means of Grammar is the most successful now? It will be remembered that the only question for the moment is how a language may be most quickly learnt. The problem is solved every day by grown-up men and women. There is not an Englishman in the country who, if he wanted to learn French, would begin by committing to memory a whole volume of rules and formulæ. By doing so, he would certainly succeed in the end; but he would know that it would be a waste of time and labour. What does the captain of a boat-club at the Universities do, if he wants to teach a man to row? Does he keep him practising, on dry land, the motions which he will have to perform, and fixing in his memory the laws which are to guide him when he enters upon work at last? Nothing of the kind. If you wish to make a man row, you will give him an oar and show him how. You will make him feel what it is like; you will make him sit behind a good pattern of the art; you will give him the advice, just as you see that he needs it. There is nothing in the whole world which is not learnt best by trying. "*Per parlare bene*," says the old Italian proverb, "*bisogne parlare male.*" No doubt, there is necessary for all practice some rudimentary conception of what the work is likely to be. A man must know which end of the oar he is to hold in his hand, and which to dip in the water. A child cannot do much in the classics till a few simple declensions have been taught him. But the sooner he can begin to "pick up" the language, the better. Let him get familiar with the commonest words, and know what they mean in English. Let him translate and retranslate the easiest possible sentences with no grammatical analysis in his head; let certain words in Latin correspond to

certain others in English. He will see, as a matter of course, that a nominative comes syntactically before a verb; and he will see it far more clearly and truly than if he knew the fact from having learnt it in the form of a rule. If we have once made sure that a boy considers the expression "us are going out," as absurd and grotesque, he not only knows, with regard to the subject of a simple sentence, enough to enable him to learn Latin and Greek without any further teaching on this head; but it may be a question whether he does not know all that there is to be said on the subject. The study of language is, at the present day, the only kind of study which deliberately professes to advance in a direction exactly the reverse of every other branch of human progress. In every other fruitful inquiry, we ascend from phenomena to principles. In classical study alone, we profess to learn principles first, and then advance to facts.

It will be remembered that we are not undervaluing the benefit that the mind may receive from understanding grammatical principles. The question is temporarily narrowed; we are asking only how a language may be most quickly learnt: and we are insisting in reply that it is by cultivating, as soon as possible, a familiarity with its words and sentences, rather than with the principles upon which these are framed and joined. It is a truly painful sight to see a boy sit down to master a set of clumsy rules, of which he will never use the half, and never understand the quarter. He is, as almost all boys are, willing to be taught. He is, as very many are, prepared to submit to a reasonable amount of drudgery. He is, we will say, of average ability and endurance. Of such a boy, we will confidently assert that, for the purpose of learning

the language to the extent to which he will probably be able to carry it at school and college, the greater part of what he has to learn in most grammars is wholly useless. His time, his temper, his docility, his confidence in his teachers, his desire to improve—all these are sacrificed in order that some analyst, for whose peculiar powers of mind the compilation of his grammar may have been a charming exercise, may not have written in vain. Pedantry gains, and English education suffers.

How then ought a set of boys to be trained, supposing that our immediate object is to make them understand a Latin writer? Plunge them, we answer, at once into the delectus. Let them begin the translation of easy sentences even before they know the declensions by heart. Never give a rule of any kind unless it is one which is clearly and obviously founded upon a collection of instances. Get the meaning accurately, and the grammar may follow as its handmaid. Never let time be wasted at a difficulty: if, when fairly coped with, it is insuperable, give quick and willing help. Be ready to tell liberally, aim at quantity as well as quality; treat inflexions invariably in connexion with their meanings. Make your accidence and syntax a result instead of a basis. So far from believing that "nil desperandum," be ready to despair very often—give up, that is, an attempt to force intelligence beyond its natural limits. The construction of relatives, for example, is a difficult subject to very young boys. If so, let it wait till they have read more, and added some hundred or so of examples to their store. In short, working always by means of reference to English, advancing regularly from known to unknown, never once allowing a statement to be taken on trust, or an abstract principle to precede its concrete illustration,

train boys to know many things which they cannot hope to understand, but never to hope to understand a thing which they have not learnt to know.

In a Greek text-book, which is learnt by most English school-boys, there occurs, as the introduction to an elaborate system of tense-forming, the following statement,—"Præsens medium et passivum formatur a præsente activo mutando ω in ομαι, ut τύπτω, τύπτομαι." This rule is supposed to be learnt by young boys in order that they may the better understand the Greek language. Now, in the first place, the statement is, as so many other rules of the same kind, absolutely false. The present passive was never yet formed from a verb in ω. The comparatively simple form in ομαι was in existence long before the contracted termination of the active. But, a grammarian may say, the pupil who has the active before him will now be able to form the passive for himself. Did any pupil ever do so since the world began? Why, he has just been learning the inflexion of τύπτομαι in his very last lesson. As a matter of fact, school-boys know very well that, when they want to think of a rule for the formation of a tense, they have to think first what the word is, and then what is the best way to get it. Their instinct reverses the illogical order which the grammar has tried to force upon them. Monstrous as these arbitrary rules are, they are but a sample of the substance of which grammars are generally full; and they are expressed in a language which the boys, however much they may translate it, can never at this period understand and make their own. It has sometimes occurred to us to fancy—but that the thing can hardly be fancied—a teacher of some other department of study attempting to succeed by the same means as those which we

have described. We will suppose that a professor of Chemistry is beginning work with his class. Proceeding upon the classical principles, he will first commit the whole of his knowledge to a volume, which he will draw up in a dry and technical style, and if possible, in a dead language. Of this, he will ask his class to learn a certain portion every day, and to believe the time may come when they may want it. He will perform a few experiments, every detail of which he will refer to their position in the book. He will urge as carefully as he can that the phosphorus takes fire, not because chemical force is set at liberty, but because the book says that it shall. He will introduce into his book-lessons the rarest metals and the most elaborate combinations, not because the pupils will commonly use them in a laboratory, but because his system is not complete without them. And when he finds that his disciples hate their work, and, in practice, hardly know an acid from a base, he will believe that the fault lies not in his mode of teaching, but in the unfortunate incompleteness of his book.

Waste of time and waste of energy generally go together. The perpetual routine of text-books wearies, distresses, dissipates. That one method of study is more pleasant than another is no small argument in its favour, if this pleasure mainly consists in a rapid process of the intellect. Lexicons, by what we have said, are to beginners almost as noxious as grammars. Every one who knows Greek in the end, must remember well how dreary have been the hours which he has spent upon the simply mechanical exercise of turning over leaves, with his eye fixed upon the heading of the page. It is monotonous, it is unintellectual, it is distasteful in the highest degree; and there is not a public school-

master in the kingdom who has the courage and the benevolence to dispense with it. Lexicons must no doubt exist, for they are needed in many ways; but there is no worse way of discovering the English equivalent of a simple word than looking it out in a dictionary. It is better to have a glossary; it is better to ask a teacher; it is better even to have a literal translation: better, simply because these methods do not waste the time of the learner, and do not spoil his temper. In his first book of Homer, an average boy will look out somewhere between two and three thousand words in his lexicon, and spend, on a moderate computation, from forty to fifty hours in the search. Grievous, however, as his waste of time in this direction is, it is work of the fingers alone; the lessons of Grammar that he learns will torture his brains as much, and will not even give him the satisfaction of feeling in the end that he has gained his grain of knowledge. He will have done something, it is true; he will not have been idle; he will have done as hard work as people do who turn a treadmill. The use of Grammar has been defended on the score that it, after all, does give something for dull boys to do. The argument is perfectly clear. It is upheld as being, after all, an excellent substitute for education.

Hitherto we have considered Grammar as a help to the knowledge of Greek and Latin; and from the idea of Grammar we exclude a few simple paradigms, and all kind of oral explanation. We assert that systematic Grammar, complete, technical, printed in a book, for the purpose of learning the dead languages, is more an encumbrance than a help. The value of Grammar itself, we have not for a moment denied.

III. But it is as an end, not as a means, that it is valuable. When once a language has been mastered,

there are few uses to which the knowledge can be more appropriately turned than that of obtaining some insight into its organism. One student may care chiefly to investigate the history of its inflexions and the architecture of its words; another may find more interest in analysing their mutual connexion. Both paths of study are worth pursuing for their own sake, and some steps may be made towards both, even while the language itself is being learnt. Only let it be accepted as a cardinal law of education, that before it can do any profitable work, the mind must have material to work upon. The study of Logic presents a close parallel to the study of Grammar. It would be possible to conceive a boy taught to argue from first principles. If, by enormous labour, he could instil into his mind the various rules of Aldrich, and regard them as a code of laws which he was bound to obey whenever a sequence of propositions presented itself to his mind, it is conceivable that he might produce the requisite conclusion from the premises before him, though he had never conducted an argument before in his life. Supposing that a system of this kind existed at our English schools, it is more than likely that a great deal would be urged in its favour. It is necessary, it would be said, to imbue the mind with true and proper rules, in order that it may be prepared to use them when the time comes. To argue, we should be told, is nothing, unless one argues from a comprehension of the rules of argument. The defenders of this system would be no more driven from their position by the fact that many people are logical without having been at Oxford, than the Grammar writers of the present day are confounded by the circumstance that Euripides wrote excellent Greek without having ever heard of an optative mood.

Putting aside that part of Grammar which depends on memory, the rest is simply a logical training. It would be hard to find a better practising-ground than Grammar for the logical studies of manhood or even of adolescence, simply because it is so copious and ready to hand. Once given that the subject can be fairly grasped, and it is one which repays a liberal expenditure of time. But it is curious that it should be regarded at schools as the only vehicle through which logical ideas should be instilled. Not till after many years of Latin and Greek does a boy really come face to face with the thoughts which the grammars put before him; while considerations about all men being animals, but all animals not being men, are so simple that boys of fifteen might well sit down to attack them. "The dative," say the grammars, "is the case of the remoter object." Nothing could be simpler to the understanding of any of us who write or who read this volume. We have a clear, an educated comprehension of the remoter object; the notion is something more to us than a mere form of words. But an average boy does not, will not, cannot actually get at it. He can be taught to know a remoter object when he sees it in print; he will say to himself that it is a kind of thing which won't do for an accusative, and yet comes in and seems to make sense. He knows it as it were on the outside; he knows it as he knows a word that is put in italics. Give him time, make him familiar with dative constructions, let his mind get strength and flexibility, and these grammatical conceptions will come to have a meaning to him; but tell him at the outset of his studies (as the grammars do) that the Latin dative means the case of the remoter object, and you will merely add another grain to that heap of evidence which is slowly accumu-

lating in his mind that learning is a thing unsuited for a young person of sense and spirit. Yet easy logical exercises would be a pleasant task for the same intellect which rejected the definition of the dative. The grammar-book—the scientific part of it—is simply too hard. High Grammar is fit to range with high astronomy or metaphysics. One actual teacher of boys, at all events, will hereby venture to question whether the meaning of an aorist is really ever grasped by any one below the age of twenty. He has found boys interested and intelligent when the nature of a syllogism or the fallacy of a proverb are explained to them; he doubts whether he has ever thoroughly conveyed to the mind of any one pupil the difference between *οὐ* and *μή*.

Let it be observed how naturally our view agrees with the practical demands of education. It is confessed that most boys gain very little from the knowledge of Greek and Latin that they pick up at school; and even if (which is devoutly to be wished) those only pursued the study of language who were likely to make some progress in it, still, at the best, it would be but a few who would be in at the death when it came to the dissection of the particles. In a word, very many learners can never master Grammar to any real purpose. The order of instruction which we claim as natural would then be also the most convenient. The mass will be able, when they cease their education, to know something of what the Greek and Latin writers said; the select few will have found their way on to the secondary goal, which but few of the writers themselves ever reached, that of understanding the exact physiology of their language. True, the study which we speak of as second in point of time will practically follow along with the mere parlance in the case of a clever boy. One group of phenomena

in language well perceived, the synthesis and comparison and arrangement of these and other groups will not be an affair of difficulty. It is not to be supposed that the acquaintance with the speech itself must be perfect before the other study commences. This is not the way in which any branch of knowledge subordinates itself to another; but the first may be, and ought to be, the measure of the second. Let things be known in the rough, before they are polished into shape. A grain of showing is worth a bushel of telling, whether the topic be a handicraft or a virtue, the performance of a trick of cards or the construction of an infinitive mood.

We are by no means inclined, indeed to make immoderate concessions, or regard the final attainment of grammatical principles as among the loftiest achievements of the mind. What, after all, is this "scholarship," upon the possession of which so many of us, with more or less reason, are in the habit of priding ourselves? A man is a fine scholar, a beautiful scholar, a finished scholar. What does this mean? It is simply that he remembers accurately the words and phrases that each particular Greek or Latin author was most in the habit of using—or, it may happen, of abusing. He knows exactly how often this trick of language occurs in Pindar, and within what limits that turn of a sentence is capable of being employed by Ovid. How far in intellectual growth has such an accomplishment brought him? Why, it is a knowledge which we should almost blush to possess in regard of Addison and Macaulay. Exactly so far as it makes us understand Greek thought better, it is worth having; but how miserably incommensurate are the means with the end. In Greek tragedy, a woman, when she speaks of herself in the plural, uses the masculine gender; and when she

speaks of herself in the masculine, uses the plural. Here is a piece of knowledge, perfectly true, laboriously proved, necessary for writing Greek iambics; and most of us who profess to know the classical languages would be ashamed of being without it. Well, how far does it go? Probably—though not certainly, for there is the widely reaching element of chance, seldom sufficiently recognized in philology—probably this practice corresponds, if we could only see it, to some sentiment lurking in the Athenian mind. The person who knows thoroughly half a hundred of such canons, will have a better equipment for ransacking and mastering Greek ideas than another who does not. That is to say, a minute acquaintance with words and phrases does in the end, and through much patience, help the clever man to place himself more fully at the point of view of an Athenian.

Let this be granted; and now let us glance at the result. Is it generally the case, that the "beautiful scholar" is the man who brings out most treasures from the chambers the dim light of which is clearer to him than to others? Is it not more often found that his long toil has made him confound the means with the end, and value his scholarship in regard of itself alone? The main object of seeing distinctly what Plato and Cicero thought, is that one may be able to look on all questions not only on the side which they now present, but on that also which they turned to observers long ago; to gain, as it were, a kind of intellectual parallax in contemplating the problems of life. Can it be fairly claimed, that high scholarship, the higher it reaches, attains more completely this object? The reverse notoriously is the case. We know well enough what becomes of the man who gives up his time to

particles. He is not the man to whom, in nine cases out of ten, his generation turns for help. There grows upon a society of "beautiful scholars" a distaste for things in which taste and refinement have little room for display, and in which breadth is more important than accuracy; and the result is a lack of sympathy with human struggles and cares. Let some social or political movement arise, in which a man of real intellectual power, real eloquence, and evident sincerity aspires, in spite of ignorance of the classics, to take a leading part. He will find favour with but a minority of the writers of dictionaries and grammars. One will see narrowness of mind, another will insist on discovering vulgarity of tone. With some he will be too base in thought, with others coarse in manner. But all will be down upon his language. A man of classical education, we shall hear, would never have spoken of the "works" of Thucydides; a man of real culture could never value the penny press as a means of popular instruction. He mispronounced an English word last session; he did not understand when an allusion was made to Patroclus; to save his life he could not cap a line in the second book of the Æneid.

> "Et les moindres défauts de ce grossier génie
> Sont ou le pléonasme, ou la cacophonie."

How much better to be able to set a common room right upon some mystic conceit of Æschylus, or correct a class of boys (out of their Primer) on the gender of *clunis* and *splen*.

It is not, however, the object of this Essay to disparage the knowledge of Latin and Greek. They may be purchased, and often are, at too high a price; but those who have gained them most easily will be least

likely to hold them too dear. Montaigne was not a man disposed to shut his eyes to the world around him, because he had learnt to speak Latin before he was able to write French. The advocates of a natural and easy method of classical teaching are sometimes challenged to give instances of the success of their system. It is certainly not easy to do so, for of late years the grammar writers have had it all their own way, and the one German apostle of a natural mode of teaching finished his career in prison; but the results of the teaching of Jacotot in France and Belgium are such as have never been surpassed, and it will be time enough to pronounce a system impossible, when in learning any modern language we cease to practise it ourselves. At any rate, there is good enough authority for learning Latin in this way. Milton distinctly urges it, and Locke in substance; but it is older than either. "Our most noble Queen Elizabeth," says Roger Ascham, "never yet took Greek nor Latin grammar in her hand after the first declining of a noun and a verb." In a year or two, by copious translation and retranslation, she learnt both languages well. It was with Lilly's Grammar that the more pedantic system came in; and that grammar, as its preface shows, was never originally intended to be learnt consecutively or by rote.

It has been said, with some degree of truth, that learning by heart is the great intellectual vice of boys. Perhaps it would be fairer to say that the tendency is so strong that it is almost certain to be misapplied. With boys of good or average memory—and none others ought to learn classics—the tendency will be directed rightly if they are made to learn examples of construction by heart, and carefully prevented from embodying the doctrines taught them in any set form of words.

In the Primer which has lately been put into the hands of the boys at most of the public schools, the first two pages of syntax consist of words of an *average* length of about three syllables each. Now there is no doubt that a boy of good memory will learn these, in time, to whatever degree of perfection his masters care to enforce; and if they were written backwards he would learn them almost as easily. But the idea that a young boy will ever *think* in polysyllables is almost humorous. The better he knows the words, indeed, the less will be, in many cases, his attempt to attach a meaning to them. The parrot does not only not think, but it even prevents itself from thinking. The pupil who is reading his Euclid will know it less well, for purposes of culture, if he attempts to commit it to memory. What is the reason that we have given up the notion of enforcing the duties of morality upon the rising generation by means of memorial precepts in English or Latin prose? It is not that the ideas of duty which they would convey are less likely than in former times to meet with illustrations in common life. It is simply because the duty is in most cases not a matter of formula; and even when it is so, the words of a formula have a tendency to remain in the corner of the memory where they have been placed. The same is true of Latin composition. A very few memorial rules are useful in cases where usage alone is a guide to what is correct; but even these have no educational value whatever, and any other than these absolutely interfere with the right understanding of a principle.

There has been some discussion during the past year with regard to the introduction into the chief public schools of Dr. Kennedy's Public School Primer. Into the merits of the book itself it is not necessary now to

enter, because, in the first place, it is irrevocably accepted at the nine public schools; and, in the second place, the general opinion of persons interested in education has already condemned the work. But, independently of its merits or demerits, the introduction of a universal text-book is distinctly a retrograde step in education. It was clearly felt to be so not long ago in Germany; and the idea, which had been mooted a few years back, was dropped by general consent. It is with us much as if the study of Aristotle were imposed once more by the authority of the Church, or an adherence to the unities by that of the managers of the London theatres. It implies the belief, which will at once be recognized as an heresy, that there are such things as eternal and immutable rules of language; that a Latin grammar is to be considered not as an interpreter of Latin, but as it were its authorized legislator. What is meant by a declension? Is it a division which the language consciously employed? Is it one which is certain, and beyond the domain of controversy? Has it any claim to be regarded as the embodiment of a law in the sense in which the word is used in science? Not at all. Distributing words into declensions is simply the best means that we can contrive for organizing them in a way which shall appear to the memory as symmetrical. The analysis of words was pushed very far among the Romans, and yet Quintilian wrote a chapter on grammar without ever mentioning the classes of declensions at all. What is to be inferred is, not that declensions are not useful, but that the division is an arbitrary one; and that any plan of education can have but little confidence in its teaching which will bind itself for the next twenty or thirty years to believe in five declensions rather than in eight or ten. No reason can

be given for the compulsory uniformity of English Schools in their method of teaching the analysis of the Latin language, which would not equally tend to show that the Universities of Oxford and Cambridge are bound to adopt the same text-book of Algebra for continuous use. This might easily be done, and an inferior book be stereotyped for a long time to come. As it is, fresh books supersede one another as the methods of algebraical working improve, and the reign of a single author at Cambridge lasts sometimes two years, sometimes twenty. In the teaching of languages, as a matter of fact, one good teacher will have one way of instructing, and another another. Common sense points out that if a boy only learns a thing well, it matters little in what way he has reached his knowledge. As for bad teachers, they will simply save their credit and their labour by teaching the primer straight through by heart.

One is driven, sometimes, in thinking of these and similar mistakes, to the verge of asserting that books are the great obstacle to education. Whether this be too audacious a paradox or not, our teaching wants sadly to be humanized. There will be some gain, no doubt, when it is once clearly understood that there is no absolute connexion between riches and the dead languages, and that a boy need not in every case be set down to a course of study for which he may be wholly unfit, just because his parents or guardians happen to be able to pay for it. But is it too much to hope that the classical teaching itself may some day cease to be the dull routine which it now so often is? It may have been remarked that in considering the reasons for which grammar may be taught, we have omitted the second of our three ideas—the one which

considers that the difficulties in a course of study ought to be left there as introducing a moral education in the struggle which is necessary for overcoming them. A person who will assert this is beyond the pale of argument. It is not worth while to discuss whether a method ought to be easy or hard. But we should even go on to say that it is the duty of a teacher not to rest as long as any difficulty exists which by any change of method can be removed. Involuntary learning is of as little use to the mind as involuntary exercise to the body.

Now it is certain that a large proportion of boys dislike the work which they have to do. Some like it; some are indifferent; a great many simply hate it. We maintain that an educator of boys has no business to be satisfied as long as this is the case. A very few may dislike all intellectual labour, just as a very few men dislike it; but these cases are as rare with boys as with men. The great mass of human beings, whether young or old, have appetites for mental food of some kind, and the reason that so many turn away from it is, that what is given them is not what they can digest. There is a sort of incongruity, which falls little short of injustice, in punishing a boy for being idle, when we know that the work which the system of his school exacts is as cramping and distorting to his mind as an ill-fitting boot to the foot. No one would claim indeed that every pupil shall have his tastes suited with minute accuracy; and the energy of a boy, if he is in good health, and otherwise happy, will carry him through minor difficulties. But no young boy since the world began has liked a Latin syntax, or a "formation of tenses," or felt anything in them for his mind to fasten upon and care for. Consider the case of

a stupid boy, or an unclassical boy, at school, and the load of repulsive labour which we lay upon him. For many hours every day we expect him to devote himself, without hope of distinction or reward, to a subject which he dislikes and fears. He has no interest in it; he has no expectation of being the better for it; he never does well; he rarely escapes doing ill. He is sometimes treated with strictness for faults to which the successful among his neighbours have no temptation; and, when he is not visited with punishment, he at least is often regarded with contempt. He may be full of lively sympathies, eager after things that interest him, willing even to sacrifice something for the sake of becoming wiser; but all that he gets in the way of intellectual education is a closer familiarity with a jargon the existence of which in the world seems to him to controvert the Argument from Design, and the chance scraps of historical and literary knowledge which fall from the lips of his routine-bound master. If only it could be regarded as an established truth that the office of a teacher is, more than anything else, to educate his pupils; to cause their minds to grow and work, rather than simply to induce them to receive; to look to labour rather than to weigh specific results; to make sure at the end of a school-half that each one of those entrusted to him has had something to interest him, quicken him, cause him to believe in knowledge, rather than simply to repeat certain pages of a book without a mistake,—then we might begin to fancy the golden time was near at hand, when boys will come up to their lessons, as they surely ought, with as little hesitation and repugnance as that with which a man sits down to his work.

This is indeed something worth being enthusiastic for.

To convince boys that intellectual growth is noble, and intellectual labour happy, that they are travelling on no purposeless errand, mounting higher every step of the way, and may as truly enjoy the toil that lifts them above their former selves, as they enjoy a race or a climb; to help the culture of their minds by every faculty of moral force, of physical vigour, of memory, of fancy, of humour, of pathos, of banter, that we have ourselves, and lead them to trust in knowledge, to hope for it, to cherish it; this, succeed as it may here and fail there, quickened as it may be by health and sympathy, or deadened by fatigue or disappointment, is a work which has in it most of the elements which life needs to give it zest. It is not to be done by putting books before boys, and hearing them so much at a time; or by offering prizes and punishments; or by assuring them that every English gentleman knows Horace. It is by making it certain to the understanding of every one that we think the knowledge worth having ourselves, and mean in every possible way, by versatile oral teaching, by patient guidance, by tone and manner and look, by anger and pity, by determination even to amuse, by frank allowance for dullness and even of indolence, to help them to attain a little of what gives us such pleasure. A man, or an older pupil, can find this help in books; a young boy needs it from the words and gestures of a teacher. There is no fear of loss of dignity. The work of teaching will be respected when the things that are taught begin to deserve respect.

Above all, the work must be easy. Few boys are ever losers from finding their task too simple, for they can always aspire to learning what is harder; many have had their school career ruined from being set to attack what was too hard. It may be said, perhaps,

that what was easy enough for past generations, ought to be easy enough for the present. Those who urge this view, may simply be asked whether they are satisfied with the working of the classical education that exists. We are not bound to depend upon Dr. Liddell's testimony, that public schoolmen are generally ignorant of Greek and Latin, for there are obvious reasons which would prevent the Dean of Christchurch from forming a satisfactory opinion on the subject; but, taking those who go to the University with those who do not, can the education that is given be said to be the best which modern ingenuity can contrive? Allowing that the very best scholars can assimilate anything whatever, and that with the very worst it is next to useless to try at all, is it true to say that the average boys have a fair chance of making the most of their powers? If not, there are two resources before the teacher. He can, as is elsewhere pointed out, vary and enlarge the basis of education; he can also, as we have ventured in this Essay to urge, teach classics so as to include more that is of rational interest, and less that is of pedantic routine.

CHAPTER IV

ON THE PRESENT SOCIAL RESULTS OF CLASSICAL EDUCATION

BY LORD HOUGHTON

THAT the whole of the boyhood and the greater part of the youth of the higher classes of our countrymen should be occupied with the study of the language, literature, history, and customs of two nations which have long ago disappeared from the surface of our globe, and which, but for the common conditions of all humanity, have no more relation to us than the inhabitants of another planet, would assuredly, if presented to our observation for the first time, appear a strange abuse of the privilege which the wealthy enjoy in the long, sedulous, and uninterrupted education of their sons. And yet the problem has its solution, and the anomaly its excuse, in the story of the intellectual progress of mankind. The empire of the Roman language plays a scarce less important part in the records of mankind than the dominion of the Roman arms. When the central power had collapsed, when the legions had retired from province after province and left the outer world to what they deemed an irreclaimable barbarism, a new and unthought-of influence was yet to come from the same region, and to spread itself over portions of the world, not only inaccessible to the force of Rome, but whose very existence was then unknown. The old

tongue became the instrument and auxiliary of the new spiritual authority that rose on the ruins of the material power; and though the Empire was for centuries Greek, Latin was becoming the expression of the thoughts and highest interests of the future civilization. And soon, while the modern languages of Europe by the side of it, and in all cases affected by it, were struggling upwards into individual life, it stood amid the inchoate and changing forms of speech in a distinct supremacy and perfection which gave it the character of the catholic and permanent utterance of the Roman race. So many of the vulgar tongues were but dialects or corruptions of the Latin, and others so interwoven with it in the process of their formation, that the conception of the Latin as the foundation of universal grammar was natural and just; and when, in course of time, it became the means of intercommunication among men from Sicily to the Hebrides, and made Augustine of Hippo intelligible to Pelagius of Wales, what other or better education was possible, than that Youth, wherever born, should be introduced into this great citizenship and community of mind and heart?

And therefore if in this latter time we have to set before us the question, whether it is wise and right that purely classical studies should retain the monopoly which they still possess in the instruction of the present and future generations of those classes of our countrymen who are free from the necessities and obligations of manual labour, and who can exercise and develop their intellectual and moral faculties to the utmost for their own pleasure and advantage and for the profit and guidance of their fellow-men, let it not be thought that there is any desire to derogate from the immense claims that the Latin language, even apart from its literature,

legitimately maintains, as an agent in the advance and cultivation of the human race.

But this main utility, this intellectual convenience, greater than ever has been the dissemination of the French, or even than will be that of the English language, among the inhabitants of the earth, has literally ceased to exist. Latin is no longer a spoken tongue; even among scholars in the departments of theology and physical science,—where the advantage of addressing *ad clerum* arguments and facts, that the ignorant may easily misapprehend or misapply, might well be appreciated,—its use is rare and has an air of pedantry: and it is discontinued in our academic disputations and discussions, though retained in the proceedings of some foreign universities. The ecclesiastical allocutions, which are the most living forms of Latin speech, though addressed *urba et orbi*, affect a small portion of our people, and even in Catholic countries require interpretation and comment. Occasional works of classical investigation and verbal criticism appear in the ancient scholarly costume, but they have a pretentious and exclusive bearing that repels even the capable reader. The complicated torture and linguistic anomaly of making Latin the vehicle of instruction in Greek is rapidly passing away from our schools, as well as the practice of illustrating the classic writers by annotations and dissertations of doubtful classicality; and in the study and processes of law, which had appropriated to it itself, in the lapse of time, a special and corrupt, but in its application throughout Europe a general and recognized, Latin diction, nothing remains, as far as British jurisprudence is concerned, beyond a few isolated and mispronounced expressions.

It has been reserved for an enthusiastic French

Phil-Hellene (M. Gustave d'Eichtal) to propose that Greek should now become the Universal Language; but even this is not more hopeless than the rehabilitation of the Latin, and there is no reason more in the teaching of the one than of the other, as far as relates to any intercourse or communication with the actual world and living men.

It will answer no purpose of argument to depreciate the effect and worth of classical scholarship. Let us have as much of it as possible. There is no danger in this time and country of the existence of a class of *Gelehrten*, who should distract the energies of the nation from the broad highways of civic life and lead them into the by-paths of abstract study, so that, while thought and speculation might be busy and free, political action might be inert and shackled. The critic and the searcher, the man to whom the records and productions of these two wondrous peoples is an inexhaustible mine of intellectual treasure,—before whom these languages, in the unalterable passiveness of their structure, lie like the dead subject under the knife of the anatomist,—who combines the curiosity of the antiquary with the induction of the philosopher,—he can owe little, if anything, to the present formal routine of classical discipline. It is doubtful, indeed, whether, if he had first come to that study at the age of sixteen, with faculties already strengthened and regulated by any sound system of education, without any ungrateful associations of the daily recurrent task and the natural resistance of boyish distraction to lessons that have no connexion with its instincts or its observation, some four or five years of conscientious and willing labour, with all the stimulus of enjoyment in progress, would not effect at least all that is required within the modest

range of an university curriculum, and leave him well armed and equipped for the campaigns and efforts of a further erudition. At any rate, it must be supremely indifferent to a man thus engaged, whether an infinite number of boys are learning one grammar or another, or construing one or other book, which it is clearly understood that they are to lay by and forget, as soon as they confront the businesses or even the pleasures of mature life.

For to the social phenomenon of all this elaborate study, which cannot be applied to any practical purpose, must be added this other peculiarity of the system, that, when once the ordinary British youth has bidden farewell to school or college, any attempt to prosecute, or even keep up, his classical attainments and interests would make him an object of curiosity, if not of censure and alarm, to all who might be solicitous for his future welfare. It is accepted that, whatever other advantages he may have derived from his public education—and they may be many—the knowledge of the ancient languages, which formed so large and indispensable a portion of it, may be at once abandoned without compunction or reproach. He has repeatedly learnt the Odes of Horace by heart, but at the age of thirty he will not be able to repeat one of them; he could once write a sort of Latin verse or prose, but that accomplishment soon utterly disappears, perhaps at no great loss to himself or others. There must be, however, some positive gain in even such a limited command of ancient literature as has been drilled into him, and if we were not case-hardened by custom, it would seem to us a scandal that it should be thus altogether thrown aside. The exceptions to this rule, of course, are numerous, and examples of men of too much mental vigour, and

memories too well exercised, to abandon easily what they have acquired with much intelligent labour, will suggest themselves to all of us. Yet follow that young lawyer who has won high honours at his university, and whose talents and industry are undeniable: he throws himself with zeal into his new profession; he sets himself to master the knowledge that may, when properly used, gain him wealth and position; he would willingly pursue his former classical studies, but he finds no time for them, even in his hours of intellectual relaxation. For these he has his French or German—which perhaps he once learnt from his sister's governess, but lost at school—or the elements of physical science, of which he now feels himself shamefully ignorant—or it may be some art—music or drawing—for which he is conscious that he possesses a true natural gift, and to which he sometimes regretfully thinks that the supple fingers or eager eyes of his boyhood might have been profitably directed. So that he must content himself with the superior enjoyment which his classical remembrances and associations may give him, if he chances to visit the scenes of ancient history; or, if he becomes the father of a family, with the means of imparting to his children the rudiments of the same education which absorbed all his early life, but to which he has so rarely reverted in his later years.

With the clergy, whose occupations are for the most part sedentary and unambitious, the results might be expected to be different, but it is not so. Outside the Universities it is rare to find a clergyman, not engaged in tuition, whose intimacy with his previous studies goes much beyond his Greek Testament, and indeed it would hardly tend to his professional credit if it was known that he spent any considerable portion of his time in

company with a literature not akin in thought and principle to his present duties. The old-fashioned conventional standard, which not only permitted, but encouraged, among ecclesiastics the familiar intercourse with heathen writers, and by which subjects indecorous or even sacrilegious when expressed in the vulgar tongue, became harmless and becoming when conveyed in Greek or Latin diction, is now obsolete; and the spiritual condition of the semi-pagan prelates of the court of Leo X. or that of the Catullus-editing divines of the seventeenth century is not very comprehensible to the modern religious mind.

If, then, the exclusive classical education, so prolonged, so elaborate, so costly, is acknowledged to be inoperative, as regards the retention of the languages and the interest in their literature, among all classes of society, except those whose business it is to continue and propagate the study, and a few scholastic amateurs, —can it be maintained that the mental discipline which it enforces is of so peculiar and unique a character as, in itself, to justify this sacrifice of human intelligence and parental expenditure? Admit all that can be adduced as to the superiority of these tongues in the regularity of their structure, the logical accuracy of their expression, the ease with which their etymology is traced and reduced to general laws, and the precision of their canons of taste and style,[1] can it be affirmed that these peculiar excellences are appreciable by the mass of schoolboys, and that these processes of thought cannot be evoked by any other instrumentality? Is the difference between these and other forms of speech such, that grammar cannot be taught efficiently in any living tongue, or that so refined a perception of style and

[1] See Dr. Temple's evidence before the Royal Commission.

taste in composition can be conveyed to the generality of young minds by these and by no other means? Now no decisive answer can be given to these questions till the test of experience has been fairly applied, and this can only be done when all the other separate and collateral circumstances that affect and distinguish the education of our public schools can be combined with other than exclusive classical teaching. When boys, in all other respects under the same intellectual and moral training, are submitted to different courses of instruction, when the grammar of living tongues is taught as accurately and scientifically as that of the dead, when the sense of beauty and fitness in diction is excited and directed by judicious exercise in the masterpieces of native and foreign literature, when diligence and aptitude in the one study or the other are equally considered and rewarded, then, and not till then, can it be positively predicated that the imagined attributes of a classical education are not referable to circumstances and treatment with which classics, as such, have nothing whatever to do, and whether the most enlightend advocates of the retention of the system are not unconsciously affected by a powerful literary superstition.

Powerful indeed,—so powerful, that its permanence and resistance to all attacks must rest on other grounds than even the intellectual approval of ages or the mental advantage of generations of mankind. It is no doubt in the social conditions and political habits of the inhabitants of modern Europe that such a belief must have been rooted, to maintain its literary supremacy through all mutations of thought and above all storms of public opinion. It is as the proper and recognized education of the governing classes, the honourable accomplishment of all aristocracy, that the classical

teaching endures so firmly, even now that it has ceased to be the mysterious speech of the Church and when it is no longer the authoritative exposition of Law. For as soon as it became the qualification of a Gentleman to read and write at all, it was Latin that he read and wrote. From Charlemagne, learning his Latin accidence at the age of forty, to the royal pedant, King James I. of England, the best classical culture of the age was ever appropriate to the highest social station. For centuries the young fancy and fresh wits of the civilized laity were nurtured with the images and incidents of old classic life, and all gentle literature was mimetic of the ancient standards. All else, tongue and word, the vehicle and the substance of native speech, were common, of the people—vulgar.

And as the community of the modes of diction and writing extended itself from the learned to the powerful and wealthy portions of society, and distantly affected the formation of the manners, as well as the mind, of Europe, *Unus sonus est totius orationis et idem stylus*,[1] might be applied, without exaggeration, to all the societies that co-operated in the revival of letters, and a certain identity has come down among them even to this moment, in which we are discussing the question whether or not classical instruction must remain the staple of the gentleman's education. These effects extended to the transactions of daily life, the euphuism of speech, the formation of all that can be comprehended in the notion of Taste. There can, indeed, be no better illustration of these indirect influences than a certain condition of high society that existed in this country in the latter part of the last century.[2] At that time the education of our public schools was no doubt

[1] Cic. Brut. 26.

[2] The eighteenth.

very inferior in accuracy and extent to that now offered or enforced; yet among the patrician class there was a considerable body of men whose tastes and habits were coloured by classical associations and interests to an extent which at this day we can hardly comprehend. Few of them had any pretensions to large or precise scholarship, and their scope and purpose were well expressed by a word which some of them brought back from Italy, *dilettanti*, to which, however, no light or disparaging sense was at that time attached. "*Virtuoso* the Italians call a man," says Dryden, "who loves the noble arts, and is a critic in them;" and it was these men who introduced *Virtu* into the luxuries of British life. They touched the rough manners of their age with a jovial grace and a genial delicacy, and they applied their wealth to the acquisition of those fine specimens of Greek and Roman sculpture which adorn our public and private galleries, and to the production of those sumptuous works of antique topography which enrich our libraries and have so few successors. To them we owe the foundation of the British Museum, the introduction of the Italian Opera, and the establishment of the Academy of British Artists. They covered the country with Palladian edifices, that only too often rose on the ruins of the pleasant commodious, old English mansions; and they decorated the city with palaces of an architecture which Mr. Ruskin tells us has found its final form in Gower Street. The range of classical writers with which they professed an acquaintance was of the most limited, but within it allusions were frequent and well understood, so that Parliamentary quotations were not exhibitions of erudition, but familiar forms of rhetorical expression. The genteel multitude affected the habits of the more in-

structed; if the public taste was bigoted and confined, at any rate it knew what it wanted, and, if monotonous, it was never confused: the notion of a Gothic House of Parliament would have convulsed the clubs, but Mr. Swinburne's "Atalanta" would have taken the town by storm. Now it may be said that this was a poor result of what was contentedly regarded as the highest education, but it was, as far as it went, a positive gain; it was a Culture,—and, if the exclusive distinction of a special class, it was at the same time a bond of intellectual sympathy that went beyond it. To men of this temper, no scholarship seemed pedantic or superfluous: they valued all they retained of the old tuition, and they respected all that could make clear to them their own memories and intuitions. The acquisition of the French and Italian tongues was facilitated and encouraged, instead of being thrust out of education, by classical teaching, and something of the common speech of former times was at least desired and attempted by this modern society. There are, indeed, still to be found among our elders some few, mostly of those who have been actively engaged in public life, who cling with affection to this literature, often the only one to which they have felt inclined during their existence—a remaining savour of the old *dilettanti* fruit, which we must not look to see repeated in an after-generation. Among future statesmen we may have serious scholars like Mr. Gladstone or Sir Cornewall Lewis, but we shall not again have Sir Robert Peel discussing with Lord John Russell what was Mr. Fox's favourite among the Odes of Horace, or sprightly men-of-the-world exchanging their Virgil and translating Homer.

Yet, however imperceptible may be the effects of classical training in after-life, either in manners or in

mind, as long as the fashion of the education endures, our higher classes will continue to subject their children to it, and the large portion of society which desires, at any cost, to give their progeny what seems to them the best start in life, will follow the example. Whilst a boy is placed, on his arrival at school, according to his classical attainments, the preliminary classical teaching becomes necessary, whatever be the sacrifice of other natural, opportune, or more available instruction, because no superiority of childly knowledge, either of words or things, would compensate for the disadvantage of an inferior position to others of his own age and ability in the new world of which he is to form a part. Our great historical schools derive such a distinct moral benefit from their association with the tone of feeling and habits of demeanour that prevail in our best British homes, that, apart from the less worthy consideration of the prestige or possible profit that their sons may derive from daily contact with the sons of the titled and the opulent, it will require some very strong impulse to decide what may be called the upper stratum of the middle class to accept for their families any education which almost appears a descent in the social scale. And yet it is precisely this class which is the most palpable sufferer under the present system. If indeed these chief laboratories of national instruction combined with their social prominence a large and systematic instruction in the requirements of active and industrial life, their tutelage would be the most effective apprenticeship to which a sensible father in that rank of life could entrust his son. Now, however, when the young manufacturer or banker begins what is to be the real business of his existence, he leaves irrevocably behind him every object to which his ten (or more) early

years have been devoted, retaining little beyond some tastes in which only the idle or the independent can indulge with impunity, and a certain dim conceit of his own superiority over his fellows, who have only received a " commercial " training.

There are too many flagrant examples in the history of the human mind of the persistent adherence, not only of public opinion and private judgment, but of the religious conscience and the moral sense, to forms and ceremonies, after the beliefs on which they were founded have faded into shadows, to permit the hope that any amount of negative experience will bring about a reformation in the matter we are now considering. It is solely to a growing conviction of the necessity of larger and wiser instruction of our governing classes, if they are to remain our governors, that we must look as the source of any beneficial change. The first, and indeed the chief, impediment to this result, is the extreme self-satisfaction with which not only our national pride, but the authority of our public institutions, regards the character of the present English gentleman. He is exhibited to us as an ideal of humanity which it is almost sinful to desire to improve or transcend; and it is, if not asserted, continually implied that if he in his youth were taught more or otherwise than he learns at present, some mysterious degradation would inevitably ensue. Now, without detracting from any single merit which is attributed to this high personality, never was there a greater confusion of *post hoc* with *propter hoc* than the theory that his actual excellent characteristics have anything whatever to do with the method of instruction which has been imparted to him. It is not pretended that he pursues, or even resumes, the study that has occupied a fourth of his probable existence : it

is not claimed that he has acquired a general taste in literature or arts, which will either serve as the basis of professional knowledge or dignify his hours of relaxation; it is admitted that he may become a landed proprietor without a notion of agriculture—a coal-owner without an inkling of geology—a sportsman without curiosity in natural history—a legislator without the elements of law: it is assumed that he may frequent foreign countries, without having acquired even a convenient intimacy with their language, and continually incur that ridicule which is especially disagreeable to his nature; and yet, in the face of all these admissions, every attempt to supply these deficiencies is regarded as little less than revolutionary. When a distinguished foreigner comes to London, it is almost impossible to collect a dinner-party in the highest circles who can speak with comfort and precision what he has a right to consider the present vernacular tongue of good society throughout Europe, and yet the study and exercise of the French language in our public schools are still little more than a caprice and superfluity, instead of being, as they ought, the substitute for that spoken Latin, which was the bond of intercommunication among civilized nations and the common dialect of gentility. But if an equality with the rest of the world in this respect is not required of the English gentleman, it might, at least, be expected that he should be furnished with all that constitutes the elementary education of the people, in the most perfect form that pedagogic skill and science can supply; that his reading should be that of a clear and intelligent utterance; that his writing should be neither "clerkly" nor illegible; and that his mechanical command of arithmetic should be secured by some comprehension of its mathematical

principles; so that if, as far as he is concerned, the classical learning has been a fiction, he shall at any rate not be in a worse condition than if he had been born in an inferior station, and with only the ordinary opportunities of instruction. But unfortunately it is this humble standard which the gentlemanlike education overleaps, or rather does not condescend to obtain, and the children of the nobleman grow up, in all these respects, often inferior to those of the butler who stands behind his chair.

It has been a skilful calumny to attribute to the promoters of scientific knowledge in our schools the desire to fill the minds of boys with a quantity of unconnected facts, or to give the character of serious mental exertion to what is at best the exercise of puerile observation. That it is in itself an immense profit for a youth to learn how to observe, and that this habit may mould and direct all his future life, is undeniable; but it is precisely not the conglomeration of the facts, but the scientific method which is above measure valuable as a training of the adolescent mind. To lay early the foundations of certainty is to build up the man of principle and conviction, and has a moral purpose beyond any intellectual gain to be derived from the distinctions and functions of language. But there is no reason why the two should not go on together, and why grammar should not be considered in connexion with its sister-sciences.

"But there is not *time* for all these various subjects of instruction, and in trying to teach all you will teach none," say the opponents. Not time! Not time in thirteen or fourteen years of life—of that life when the faculties are most active, the memory most retentive, the will most ductile? Not time for the wealthy and

the leisurely, for those who are destined to advise, direct, and lead the affairs of their country and the destinies of other men, to be taught aptly and completely the use of those instruments of intelligence which their less fortunate fellows have to acquire, as best they may, in some five or six years of boyhood, before they enter on the earnest strife of social existence?

And this is probably the form in which the decision of the question of the continuance of the classical education in this country will take place. If our public schools and universities can, as seems practicable, combine the ancient and honoured mode of instruction with the peremptory requirements of the present age, the presumption of classical superiority may not only be sustained but may become an admitted fact. Let a youth come forth from his academic career familiar with the phenomena of the world about him, apprehensive of scientific principles, comprehending the facts and deductions of the history of mankind, sufficiently at home in the great societies of Europe to enjoy their intercourse and profit by observation, and, in addition to these qualifications, a good classical scholar, he will not only himself be too conscious of the value of the accomplishment to permit it to be disused and forgotten, but his possession of it will elevate him in general esteem and assist him in many special objects of life.

For it is as the complement of European culture that these literatures can alone retain their hold over the minds of men. The East has now revealed the higher reservoirs of the stream of human speech, and the eye of the historian reaches to far more distant ranges of the civilization of mankind. But, though ceasing to be the only scholarly learning, they may well retain their

parental relation to the ethical and political life, to the taste and intelligence of the modern world, if they are only raised from the degradation to which they are now submitted in the profitless drudgery of elemental instruction. They may become the exceptions and ennobling study of numerous persons who will find them interesting and useful realities, instead of being, as they now are, receptacles of dead names and phantasms, and impediments to practical knowledge and scientific truth.

There is a negative effect of the assumed universality of classical culture which it is worth while to consider, and, if possible, to remedy. No one is averse to showing his familiarity with Don Quixote, though he is ignorant of Spanish, nor does an absence of the knowledge of Italian or German prevent the enjoyment of Cary's "Dante" or Anstey's "Faust." Still less is an acquaintance with Oriental languages thought necessary for an interest in, and appreciation of, the history, literature, manners, and thought of Eastern peoples, from the "Arabian Nights" of our childhood, to Professor Wilson's Sanskrit Philosophy. Indeed, it is notorious that works of the value of Baron de Bunsen's "Bibelwerke," and Barthelemy St. Hilaire's researches on Boodha and Mohammed, have been produced without any assumption of Oriental scholarship. But there has come to seem something incongruous and offensive in any man's assuming to know or care about classic objects or classic letters, without having been taught to construe Greek and Latin. Thus a large field of converse and discussion is practically closed to numbers of educated persons perfectly capable of comprehending and criticizing its meaning and spirit, and a serious intellectual barrier is raised, not only between man and

man, but, almost universally, between man and woman, both in general society and in domestic intercourse.

Some relief to this defect would no doubt be afforded by the more frank recognition of the worth and use of translations into modern languages, which represent, as truly as may be, the graces of form and the essential merits of the original writers; versions, not merely accurate, but sympathetic with the matter and the style they are handling—of poetry by poets, or oratory by orators, of history and philosophy by affectionate students of the emotions and reflections of mankind. These should, by right, be the most effective material of school training, instead of being prohibited and regarded as substitutes for severe study and inducements to juvenile indolence. But the true encouragement to a more general and unpedantic cultivation of what is universal and enduring in classic literature and life, beyond the mechanism of language, would result from such an alteration of the habitual methods of instruction as would strive, first and foremost, to fill the mind of each pupil with the realities of the past, and to make the thoughts and deeds of those old existences as intelligible to him as the events of his own time or the workings of his own observation. Then, as he grew to manhood, they would be no longer a fairy or rather demon-world, which the activities or pleasures of the present and the aspirations or interests of the future equally authorize him to quit for ever, but an order of things in which he would feel a life-long concern, and which would mingle with all the conclusions of his increasing knowledge and the intellectual relations of his advancing years.

To conclude, it can be no abstract advantage, with the present political prospects of this country, and in-

deed of Europe, that any education should retain an exclusive or class character. The free and intimate association of men of different birth in professional occupations is accepted by our aristocracy with that good sense which enables them to maintain a social influence almost extinguished in European communities, and which is one of our best safeguards in the perplexities of the future. Any training which tends to keep up distinctions, whether real or fictitious, must injure the community of views and objects, which is so essential not only to personal comfort, but to advancement in any special avocation. We already hear the young ambitious Engineer or adventurous Colonist lamenting over his lost time and unemployed abilities, and speaking in no measured terms of reproach of what has been to him an inappropriate discipline, of which he so little appreciates the indirect and secondary advantages, that he regards the toils of his boyhood with unmitigated disgust. Is it impossible to make a satisfactory compromise between the just exigencies of our age and the honourable traditions of past generations—one more compromise in a country and among a people who wisely have made so many?

CHAPTER V

ON THE EDUCATION OF THE REASONING FACULTIES

BY W. JOHNSON, M.A.

ACCORDING to the custom of certain public schools, a classical teacher enters upon his duties as soon as he has taken his degree as a Bachelor of Arts, without undergoing any professional training, without attending any course of lectures on education, without having read any book on the subject. He is supposed to conform to the traditions of the establishment to which he attaches himself, and in case of doubt or obstruction to apply for advice or support to senior teachers and to the head-master. His outfit for this enterprise may consist—and certainly did, twenty years ago, often consist—of a few score classical volumes read and pencilled more or less carefully, a few drawers full of manuscripts of his own composition, or copied from the stock of a private tutor, and a few commonplace books containing the notes taken at college or university lectures. It is the same stock with which he would have entered on the business of a private tutor at the university. He is fortunate if he has been kept waiting for a vacancy long enough to have spent a few months at Dresden, Rome, or Tours; for it is in the first few months after the degree that the academical mind passes through its fermentation, nor is there any time of life in which knowledge is acquired more rapidly or assimilated

more thoroughly. If one could afford to remain unemployed, and the school could dispense with one's services, it would be in the highest degree desirable to assure oneself a considerable interval between the undergraduate's excitement and the schoolmaster's servitude. It is not that one is put into the grooves of professional duty blindly or even hastily, since it generally happens that one has been able, as a lad of eighteen at school, to observe the processes of the master; and to the college student not many topics of conversation are more familiar than the defects and absurdities of his school, few convictions stronger than that of his being himself intended by Providence to supply and amend them. The incepting Bachelor is likely to be at once fervent in admiration of an idealized institution, and of one or two living persons belonging to it, and bitter in contempt for the actual practice of the business. Having earned his appointment by success in the dead languages, he is instigated on the one hand by the wish to communicate what he has himself learnt from honoured academical instructors, and on the other hand by a generous impatience yearning for a very different kind of knowledge. The very skill in classical composition which he has gained in ten or twelve years of training seems to him, on his first professional attempts, incommunicable; for the young boys who are thrown upon him are surprisingly remote from him, and he cannot remember what he was at their age. The more he tries to bring his pupils up to the standard of erudition fixed for him at college, the more does he marvel and shudder at their feebleness. He has lived for four years with robust intellects; he has now to live amongst incomprehensibly small and shallow minds. Enthusiasm forbids him to believe that boyhood

is stupid and frivolous; surely it must be the parents, the governesses, the preparatory schools, the selfish and narrow-minded people who rule the public school itself, that are answerable for the failure. Could one but bring to bear on these obscurantists the spirit of the university, surely the face of things would soon alter. What is it that is needed? one asks. Conscientious accuracy, syntax treated deductively, rigid Atticism, unbending orthodoxy in Latin idiom, constant reference to the latest German authorities, unflinching surrender of old-fashioned formularies, a sort of Protestantism in scholarship,—this is what the young schoolmaster, so far as human frailty allows, professes and practises. This he does strictly in the spirit of duty, denying himself all the while; for in his heart he has always liked something else, let us call it history, or philosophy, far more than Porsonine. In fact, he thinks philology, or the critical study of Greek and Latin Literature, rather dry and rather shallow; he teaches what he knows of it, which is indeed far less than he at the time imagines, because he has been told by his *Alma Mater* to count it a jewel, and experience convinces him that it is convertible into very substantial British gold. If he had his own way, he would be preaching the superiority of Bossuet to Luther, the importance of Celtic affinities, the craniology of the South Seas; or, if drawn back by the old Muses, he would at least rather descant on Bopp than on Jelf. But to a certain extent, with certain modifications, he must serve the world; and, inasmuch as scholarships and fellowships are manifestly won by prosody and the oblique oration, he must give his fifty or sixty hours a week without an audible murmur to parsing, and scanning, and saying by heart: only he

does all this, he flatters himself, with more integrity than his elders. To this ascetic missionary spirit come the first holidays as an emancipation of the mind. From the images in the mirror one turns to the live things moving on the bank beyond the river. At a leap one plunges into that which one believes to be the philosophy of the present, or at least of the esoteric present which is to leaven the coming age. Then, if human affairs were but conducted at all methodically, then would be the time for initiation into society, for the give and take of London life, for contact with cheerful and enlightened men. But circumstances push the young schoolmaster into moping, varied only by desultory reading. He has lost the precious sympathy and the wholesome mirth of undergraduate friends. His intellectual appetites must be fed without social cookery. He is to fill up, as best he may, by uncritical and uncriticized reading, the lamentable gaps which a so-called liberal education has left in his mind. A strong will, no doubt, would take him to the persevering study of law or physics, or of a modern or of an Oriental language. But men of strong will do not so very often become schoolmasters : the work of schools must be done by men who have for the most part not enough energy for sustained inquiry : the classical teacher is generally a possible clergyman in his strength and in his weakness, not a lawyer, nor a man of science, nor an archæologist. Let it be supposed, then, that into the hands of such a young man as we have imagined, a successful versifier with a leaning towards modern culture, but with no genius, no fixed resolution, no encyclopædic training, in fact, a very imperfectly educated man, falls a book of force and breadth, opening up like " a great instauration " noble vistas of

knowledge, convincing him of his miserable ignorance, and making him believe in some occult force of reason that works below and across the currents of public habit and of rhetorical influences. Is it necessary to tell any reader of this volume, that there are such books? Does any one read to the end of these pages, who has not, some time or other, felt the trumpet-sound of passionless reason, putting to shame his hereditary scruples? No need to name an author; no one can safely do so: utter a name, and you are henceforth to walk with a label round your neck. It is enough to say that, if Cleombrotus by reading one book was lifted into the belief of his immortality, a young Englishman also may have been by one book of a fellow-countryman impelled, in spite of tangled and conflicting sentiments, to fall into the interminable procession of those who find no rest till the secrets of the universe are disclosed. There is a great gulf between those who are satisfied with examining and renovating the mental products of past times, whether they be ecclesiastical antiquaries, or editors of old books, or imitators of old word-melodies, and those others who study the past chiefly out of gratitude, partly for warnings against error, but are all the while straining beyond the duration of single lives towards the enlargement of fruitful knowledge and the progress of beloved mankind. Once having tasted of this great river, how could one turn back to the cisterns of dead literature!

A teacher once for all inoculated with a taste for inductive reasoning, however incapacited himself by nature and by habit for really partaking in discovery, can hardly fail to have his mind, such as it is, set upon undertakings different from the collation of

parallel passages in the ancient authors. Might he not even then, when leisure and freedom from worldly cares were lost, gather together some scientific information, and fertilize therewith the ingenuous youth subjected to his influence?

There can be no study of science without constant reference to number, weight, and linear measurement. He, therefore, who has been cruelly left for twenty years of adolescence to drift about without these anchors and compasses, must renounce the notion of being a man of science. Granted: yet he may create an inquisitiveness; he may open for others the doors of chambers which he may not himself explore. In such a case it may seem possible, and, if this be an illusion, it is at least an honourable illusion, to attend lectures and give out some of the teaching in a form available for younger minds, to collect books, to pick the brains of better educated friends, to skim the history of science and put the biography of inductive philosophers in as fair a light as the lives of orators and poets, to encourage any gleam of a talent for observation, to encourage in particular the instinct of the collector, and as far as possible to turn collection into classification, to propound little puzzles in pneumatics or the like, to get together and display a little apparatus of scientific instruments and toys. If such attempts have been made, and have produced but little effect, set down the failure to weakness of purpose; but conclude not that they were in themselves erroneous attempts. Fifty years ago it would have been thought rather paradoxical to deny that parents and grown-up people generally ought to open the eyes of the young at table, and in walks, to the curiosities of nature. The very Romans, whom the philological educators

profess to honour, learnt and taught all that they could of the properties of matter. When the philologists stooped so low in accommodation to the spirit of the age as to ingraft on linguistic teaching a year's course of comparative geography, and preluded this geography with a chapter on the solar system and a diagram to explain the seasons, they were unconsciously conceding a principle, they were introducing science. If horror-stricken at their own act, let them take comfort; they were doing what Virgil wished to do, and Cicero thought he had done.

It is not pretended that one who gives his spare hours and his spare cash to a smattering of scientific information, which is to be beaten out into a mere film on the memories of boys, has any right to be reckoned even as a camp follower in the army of searching adventurers. Nothing short of an incorporation into the school-work in which boys are systematically examined, with all the dark background of penal necessity, can be held to do justice to the claims of science. Without a perfect obligation a study has no root in a school.

And yet it may seem strange and sad that a man actually living with boys, and having no other object than their good, should not be able effectually to do what an intelligent man can do for his children; elicit their curiosity by directing their attention to natural phenomena, and, without consideration of reward or punishment, open their minds to contemplate the forms of life, and explore the sequences and uniformities of the inorganic world. It is painful to enumerate all that we leave unnoticed; the "natural questions" which a Seneca would have asked, which we, the distant heirs of Seneca, either slight or dread. We force our pupils to say in Latin verse, that sounds to me almost as the

voice of the Fairy Queen summoning the rhymer, "Happy is he who hath been able to learn the causes of things, why the earth trembles, and the deep seas gape;" and yet we are not to tell them. Virgil humbly grieved, but we grieve not, that we cannot reach these realms of wonder. A full-grown educated Englishman climbs a few steps to a telescope standing by Napoleon's trophy, gazes for a minute, comes down awed with a new sense of the earth's motion: so quickly has the splendid sphere we call Jupiter passed from the field of vision. It is then a new thing to him to feel and know that the earth is moving. The bright nymph, who brings messages from the gods, is well called the daughter of Wonder, Iris Thaumantias. The English Theætetus is condemned, for fear of being desultory and superficial, to keep aloof from those who can make him wonder and inquire. On the first of July, every year (says a naturalist), whether it has been a cold or a warm June, the spiky purple loosestrife rises into her place on the banks of the Thames. It is no hindrance to the growth of a literary taste to be taught something of the earth's relations to the sun; of the insignificance of atmospheric changes compared with that solar power which lies beyond the shallow rain-clouds. It is of the very essence of poetry to look at the flower and think that, by reason of the sun's stellar course carrying the planet with it, the flower does not blow twice in the same point of heavenly space. What would Lucretius have thought of men who knew, or might know, such things, and were afraid to tell the young of them for fear of spoiling their perception of his peculiarities? How would Ovid flout at us if he heard that we could unfold the boundless mysteries contained in his germinal saying, "All things change, nothing perishes," and

passed them by to potter over his little ingenuities. If our minds were well stored and active, we might incidentally throw out many hints about plants and animals, and stars, we might rid boys of many illusions about sound, light, and heat, without making any deduction from the hours given to the study of language and literature. As it is, our laborious games absorb much of the time which, in the days of Miss Edgeworth and Mr. Joyce, would have been spent in training the eye to observe things passing in field and hedge-row. Games are so absorbing that they prevent boys, even when not playing but sauntering, from thinking or talking of any other topic; and in the holidays there is hardly a father who tries to divert his son's mind from dogs and horses; nor can I bring to mind more than one or two that have sent their children, when obliged to stay in London, to the museums and lectures, which might, to a great extent, supply the deficiencies of school. With all the worship of the horse, no boy knows, by way of home-taught knowledge, what is the true name for a horse's knee. With all their love of boats, they think that a heavy boat, other things being equal, goes faster than a light one down stream. Several boys have a decided taste for machinery, and in particular for locomotive steam-engines; but even these boys cannot state the principle of the engine.

Ignorance and indifference such as this cannot, I am sorrowfully convinced, be cured by the occasional propounding of scientific puzzles, by the display of scientific toys, by reproducing in talk what has been carried away from lectures.

I have tried all this, not indeed with perseverance, but with genuine eagerness. The attempts were made

mainly in conformity with the teaching of that very remarkable man, who ought not to be forgotten, the late Dean of Hereford, Dawes, of King's Somborne, whose village school was, about 1849, the hope and delight of all who wished to make peasants think. His pamphlet, suggesting many charming household experiments, was obeyed faithfully in my pupil-room; the only easy day of the seven was made a day of labour, week after week, in preparing experiments. What a man of no genius and of no sort of scientific or mathematical training could do by hunting amongst friends for information, was done strenuously. Physical geography, in those days a rather popular subject, was engrafted, as far as possible, on the school exercises in comparative or historical geography. Visitors were pressed into the service to give lectures on the mechanical powers, on astronomy, on geology. Tables of specific gravities and heat-conductivities hung on the walls, with zoological charts, and hydrographical and geological maps. Once a week a paper containing four or five questions, got up by reading scores of volumes of scientific voyages and travels, was hung up for volunteers: questions such as these:—(1) "A navigator keeps dipping his thermometer into the sea to take the temperature of the surface water: he finds a sudden change, and infers that he has come to a shoal. Why?" (2) "A bridge built partly of cast, partly of wrought, iron is insecure. Why?" (3) "In surveying at sea they take a base line by sound, by observing how many seconds intervene between the flash and the report of a gun fired in a boat some way off. They multiply the number of seconds by 1090, and so get the number of feet between ship and boat. But they have to add a foot for every two degrees of thermometer above

freezing-point. Why?"—In setting these questions, which were always intermingled with zoology, much use was made of the Admiralty Manual of Scientific Inquiry. The questions were in a great measure the fruit of undisguised "cramming," so much so that he who set them cannot himself at this distance of time answer some of those which remain amongst his papers: but to read for this purpose such books as Ermann's Siberia, Wrangel's Siberia, Darwin's Voyage round the World, Forbes on Glaciers, Carpenter's Zoology, Reid on Storms, Herschel's Discourse on the Study of Natural Philosophy, and the like, seems, on calm reflection, a more satisfactory employment than the reading of Copleston's Prælectiones, or Muller's Dorians. Of what are called results obtained, no boast shall be made. It was at least better to have tried and failed than never to have tried at all.

On reviewing these early attempts at the enlargement of boyish minds, it now seems that, over and above the insurmountable obstacles presented to an untrained teacher struggling alone against his own misconceptions as well as the littleness of others, there must have been one fatal defect the mention of which would supersede the need of reference to any other hindrance. There was hardly any subject-matter for criticism. The boys did no exercises: nothing but a few papers of answers to a few questions, and perhaps a map or two differing from common maps in the notice taken of economic geology. It is a superficial and disappointing work to communicate knowledge to young boys without frequent reiteration and close examination. In evidence given before the Public Schools Commission certain eminent philosophers declared their belief that the elements of science could be with ease made known to young boys; and on

the high authority of Mr. Faraday [1] the Commissioners seem to have at once formed an opinion to the same effect. But Mr. Faraday has probably never examined those children whom he used so charmingly and brilliantly to keep listening and watching for an hour, and whom at the end of the hour he would invite so winningly to his magic semicircle. No one who witnessed that truly beautiful spectacle of a sage surrounded by happy sparkling faces of children could think any teaching of schoolmasters worth mentioning. There never can be in any school such a teacher. The remembrance of him as he appeared in those hours is delightful and unique. Yet there is no sacrilege in doubting whether he would have found on the morrow of one of his lectures anything like an accurate reproduction of a tenth of the lesson given *on paper* by a tenth of the learners. No child would ever forget that he had seen a diamond burnt; but few would have been able at the end of a week to prove the hollowness of flame, or the heaviness of carbonic acid gas. Up to a certain age boys are generally eager and attentive listeners, and when their attention is kept up not only by a sweet and noble manner, but by marvellous demonstrations, their eyes and souls seem to vie with the carbon burning in oxygen. But we cannot, as Mr. Faraday told the children, burn a diamond every day. The man of genius cannot do the school's drudgery.

Without demonstrations, a lesson in natural history or in natural philosophy would not be very different in method from a lesson in grammar. With demonstrations it would closely resemble a lesson in geography. The terminology of a science can no doubt be learnt by boys; but it would be learnt through a long course of

[1] This was written before Mr. Faraday's death.

forgettings and remindings; and it is the regular schoolmaster, not the lecturer, much less the man of originality and research, who will stand the wear and tear of this Sysiphean labour. Nor indeed would the reasoning faculties, beyond the rudimentary powers of attention and memory, be expanded by this study of terminology. A show of mental activity is easily made by recourse to a vulgar art and a cheap force. The emulation of young boys will keep up a phosphorescence without the combustion of a solid. You may think boys are improving their minds when they are merely playing a game. Classwork with the *young boys* is very much like a game in which the master is the principal player. In the earlier years of public school life the liveliest boys are making scores in school as in the playground. One in a hundred has a real desire of knowledge for its own sake—knowledge apart from imaginative excitement. The tutor may teach the individual pupil just as the father can teach his son, and half an hour of this is worth some hours of competition in class. But we are to find some method which will at once nourish the love of truth and subject whole classes to discipline, some task which the schoolmaster can accomplish a thousand times without special preparation, and yet with a certainty of bringing his mind to bear authoritatively on subject minds. There are two processes in what may be called the classical method of instruction; construing with parsing, which may be called the oral analysis of sentences, and composition with the altering of exercises. In certain schools a long and unbroken tradition, sustained by much genuine faith and honest energy, has established these habits of literary work on a footing which seems to be secure from scepticism or egotism. It seems, after long prac-

tice and much consideration, that there is a solid and sufficiently broad theory for these empirically established habits. Giving up the old distinction between demonstrative and catechetical teaching, one would say that oral analysis and the correction of exercises are two forms of criticism; and the theory is, that effectual instruction is critical instruction. Using the terms rhetoric and logic in the mediæval sense, I will venture to say that I was taught by men who applied criticism to rhetoric, and I have taught myself to apply criticism to logic as well as to rhetoric. With many oscillations, and much infirmity of purpose, I have for twenty-two years, with classes of sixty, of forty, of thirty, with sets of pupils varying from twenty to three, and also with single pupils, cultivated what is called taste—or the art of expression, in conformity with an excellent tradition, and in obedience to academical authorities of the highest order. Nor is it in this paper asserted or implied that propriety of language is not a more attainable result of classical training than correctness of thought. But it has of late years become manifest, that what was taken for classical taste by those who did battle against useful knowledge was, to a great extent, irrational imitation and phrase-mongery. Taste after all is not a mere cultivated instinct or perception, like an ear for music. It is discrimination, a kind of reasoning. A logician need not be ashamed to study those curious artifices by which Virgil heightens the effect of his statements; in "hypallage" and "hendiadys" there is scope for rational choice. It is one thing to put together dissimilar words, as Tacitus does, for poetical effect; another thing to use two similar words where one will do, as Cicero does, for mere copiousness of sound. The monstrous fatuities which disfigure Æschylus are

condemned by the clear head of an Aristophanes, and can be proved to be bad. Amongst the worthies whose names are used as bludgeons to beat us with, there was at least one whose taste was inextricably combined with his reasoning powers, Mr. Fox. He would not have abetted the defenders of the classical faith in teaching boys to wrap their truisms in the drapery of Cicero; but he would have encouraged them to state a case or tell a story like Herodotus, Euripides, and Ovid. Think and write like Mr. Fox, and you will use Latin unaffectedly and straightforwardly to do justice to your subject: you will not choose a subject which will enable you to bring in your stored phrases. The desire of doing at schools what is done at our universities has led to very absurd results with ordinary schoolmasters, who have made it their object to get Greek verses written, like the Porson prize exercises, by tesselating bits of Attic idiom, and have broken their hearts in hopeless attempts to get Latin prose written as it is written by Oxford professors. It is only after an incalculable amount of trouble bestowed upon these desperately hard falsettoes that it has become a fixed resolve to insist upon boys' exercises being intelligible by themselves, and their phraseology strictly subordinate to the subject-matter, and also to make corrections or additions which explain themselves, and fit exactly to the text that has to be amended. Require of a boy an exercise which will make sense, however humble, without a commentary from its author. Strike out every couplet that is not needed, every clause that returns upon a preceding clause, every preamble which is not sufficiently backed up, every inferential expression that is not warranted. This is a more salutary operation than the attack upon idle adjectives with which some critics of the last generation were inclined to

be contented; it is the ploughing of the subsoil. And then to alter an exercise, so as to do justice to the young author's intention, treating him with just so much respect as he deserves, filling his slender wandering rivulets with a sufficient flow of words, but carefully following the main direction of the stream, unless he be wholly in error, breaking up a long period for clearness, if needs be, varying the cadences to please the ear, making effective contrast by mere arrangement of words without particles, not to speak of all the pretty little artifices that are taken from Ovid and Livy—surely this is almost a fine art, the gardening of the mind, and a rational method withal.

The objection will be raised that poetic diction is just as much as rhetorical vapouring a kind of falsetto, and that the study of poetic diction is as unfavourable to the pursuit of truth as any other system of artifices. Now there are certain arrangements made in versification which need no defence: for instance, to say "they run, the enemy pursuing," instead of "they run pursued by the enemy," is an artifice suggested by the exigencies of metre, though adopted by prose writers merely for the sake of variety. The exigencies of metre in Latin verse, whatever mischief they may do in the way of exaggeration or suppression, do not, like the demands of rhyme in English verse, induce one to enter upon a thought or an image that nothing else would have engendered; and it will appear on comparison that the Latin verse of young people, even their lyric verse with its semblance of emotion, is more honest, more sincere, than their English rhymed verse. The artifices of which a specimen has just been given are as innocent as algebraical substitutions, to which they are analogous. But beyond these metrical contrivances lie the figures

of Virgilian rhetoric, which are the weapons of more advanced versifiers: to use them rightly is a proof of keen discrimination, and in using them no one can deceive himself or his reader, since they are felt to be departures from literal truth: they are not more deceptive than the red chalk or the sepia of a drawing.

There are, it is readily admitted, only a few who can arrive at the rational use of poetic diction, nor is it my wish to recommend the expenditure of so much labour as it requires. Granted that we have not time to spare for this, I maintain that we shall not do well to substitute Ciceronian prose. Whatever may be said of our attempts at writing like Virgil, it is not good to imitate the copiousness and subarticulation of Cicero's periods, because they never have been imitated successfully even by the best scholars, and because the habit of writing that kind of Latin is likely to hinder the formation of a direct, lucid, and solidly impressive method of making statements. The Oxford Professor of Latin gave a bit of evidence to the Public Schools Commissioners which hits the nail on the head: it was to the effect that, whereas a verse is within the grasp of a boy's understanding, a Latin sentence is to him an impenetrable mystery. Another Oxford man, in a light and pleasant defence of classical instruction, has amused himself by playing with an English sentence and exhibiting many ways of turning it into Latin prose, advancing from the boldest and clumsiest to the most elegant and idiomatic rendering. When such a man of genius as Mr. John Henry Newman deigns to lecture on the art of writing Latin he is something more than an authority; but an experienced schoolmaster knows and feels sorely that this mastery of Latin idiom, attained by Oxford men after some years of

College tuition, is quite out of reach at school, and that the labour bestowed upon trying to make boys write elegant Latin prose is even more fruitless than the study of Latin versification. Few things can be more difficult than to get a boy to appreciate the best Ciceronian prose; and as it is after all one of the curiosities of literature it seems strange that it should be so very highly valued at Oxford.

What then is the province of Latin prose in a school? There are two ways of dealing with it for the cultivation of the reasoning powers, both subjected to much more limitation than might be wished. It is expedient to practise translation into Latin prose from those English writers before Addison, whose grooves of thought are parallel to the simplest Latin style; and here we should avoid the mistake of those who set passages out of histories of Greece and Rome on the illogical assumption that English written about the ancients goes easily into ancient languages; the truth being that it is much easier to translate Johnes' Froissart into Latin than Gibbon, or Arnold, or Merivale. This kind of translation is so easy as to be no substitute for verse-making as a test of mental vigour, and it does not do much for the reason; but it prepares you for a higher kind of work. Having attained some sort of skill in rendering simple statements from one language to another, one should go on to select passages from the rational authors of the eighteenth century who write on solid subjects, such as Robertson, Adam Smith, and Paley, and from translations (if need be) of such French writers as Montesquieu, and Dumont, the friend of Bentham. Here one would be studying something valuable for its own sake; translating is perhaps the most effectual way of securing attention to the meaning of a philosophical passage.

But better still is an abstract or reduction, like the engraving of a picture on a smaller scale. Whichever is attempted, one must not be shocked at a certain amount of barbarism in the Latin; for the old language will not bear the full modern thought. It would be better to write Latin like Bacon or the translator of Bacon, and at the same time bring out the whole meaning of a modern philosopher, than to skirt the fences, to evade the difficulty, for the sake of a certain elegance. In any case, the Latin language must be a hindrance to the full culture of the reason. With all its merits it is not a proper vehicle for philosophy. If we are debarred from the use of any other, we must make the best of it; nor is it too great a tax on patience to search up and down for something that will go into Latin without being frivolous. It has been ascertained experimentally that such a subject as the influence of a solar eclipse on vegetables and animals (recorded in the journals of 1851), or Sir Humphry Davy's theory of the decay of buildings contained in his Consolations of Travel, can be treated by boys in Latin hexameters, and that the theory of Springs, of the Barometer, of Coral Islands, of Money, of Usury, of Parliamentary Representation, of Government Interference with Trade, can be handled tolerably well in plain but sound Latin prose. To enlarge the list of subjects both in verse and prose has been an undertaking carried on in spite of much discouragement and failure for seventeen years; and one of the conclusions is this, that literature, rightly understood, includes the cream of all philosophy, so that the literary teacher in a classical school, having at his command the perfect obligation of the weekly rent paid by the boy for the enjoyment of his public school life in the form of "composition," is able, not indeed to teach any branch of

science, but to make boys understand where the sciences lie, how they were put together, how they bear upon one another, what is the vice of the spurious forms of science, from what errors mankind has been delivered, and how much remains under the seal. It is conceded that "history" is in the province of the classical master. Let this word, used by many in a feeble way to mean all that is not philology or divinity, be interpreted broadly, as Mr. Hallam, for instance, understood it. Let us be allowed the three volumes of the Middle Ages, a book which has now some right to be called a classic. Look at its table of contents, and you will find the historian taking stock of human knowledge for the end of the Middle Ages. It appears that by history he does not mean merely a record of alliances, expeditions, battles, sieges, treaties, conspiracies, assassinations, and caprices. He embraces, besides all this law, church, school, and all that belongs to them. If we follow him into this greater work, the Introduction to the Literature of Europe, we shall find a record of critical changes, not in the fortunes of monarchies, but in the psychology of mankind. It is not pretended that all which Mr. Hallam sets forth is to be taught at school: but it is most decidedly asserted that nearly all this history of human progress and panorama of things cognizable, expanded to include the eighteenth and nineteenth centuries, ought to be so far known to the literary teacher as to be thrown open by him to his classes, in the hope that some few at least will explore some chambers of the treasure house. It is a shameful thing to set exercises from week to week for a score or two of years, and never bid boys lift their eyes above some few periods of carnage and crime, such as the first few years of the second Punic War, the campaigns of Sertorius, and "the three

battles" of Alexander; to let people grow up in the belief that luxury ruined Rome in the days of Augustus, and that the Goths came directly after Juvenal, to leave English Churchmen in ignorance of Augustine, and Benedict, and Anselm, to let English tourists walk the galleries with no recognition of what they are told by their guides and catalogues, to send men into Parliament as having taken first classes in history and law who could not answer ten questions in the Indian Civil Service papers on those very subjects. If there is a clear proof to be found of the frivolity of our classical education it is the habitual misconception of the term history, its miserable limitation to a tissue of homicide and perfidy stitched together with dates.

The champions of the philological routine are known to speak with great force on "cramming." Everything that is not syntax or idiom is with them "cram." And yet they had themselves encouraged a considerable amount of hasty reading of commentaries and manuals, and even dictionaries. Any one, they say, can get up an English book just for an examination; it is no test of power or of taste. There is much truth in this, and it must be admitted that, if the examiner frames his questions by doggedly following the headings of chapters, he is likely to bring upon himself a heavy and undigested mass of statement, which will almost overwhelm him when he has to read and give marks for the answers. Nor can any occupation be at once more wearisome to the man, and more uninstructive to the boy, than such an examination. But let the questions be in some measure of the nature of "problems" as opposed to "book-work," let them vary from minute particulars to broad generalities, let there be a physical limit set to the answers by serving out papers which allow so

much space for each question, let the manuscripts be to some extent treated critically, and returned with marks of praise or blame to their authors, and let the examiner take notes of the more remarkable answers, whether good or bad, so as to lecture upon the paper after it is all over; and then an examination in a book will be an intellectual process.[1] Granted, however, that there must be much crudity and looseness in the temporary knowledge taken into a history examination, and that it is at the best a less severe and stringent method than the correction of exercises, we are thus brought back to the consideration, that "history" is to be taught through composition, or, in other words, taught critically. But we are not to narrow it and emasculate it merely because pure Latinity requires the sacrifice. We are not to linger within the beaten track of Hannibal and luxury for fear of losing sight of our models. The Romans, whom we profess to imitate in their method of education, wrote and declaimed on all available subjects. Our idol, Cicero, has a good deal more in him than his reiterated praises of eloquence and political virtue. He must have traversed the whole of Lucullus' library; he must have been "desultory;" he must have written on many matters with only a smattering of knowledge. The variety of his books rebukes his professional imitators; his example is followed more by those who try to enlarge the scope of composition than by those who seem to hold that, for boys, nothing

[1] It is to be regretted that the University local examinations allow no opportunity to the examiners of explaining to the candidates what answer ought to have been given. Scattered as they are over the country, nothing can be done except by circulating a printed paper giving the right answers, and commenting on some of the prevalent and dangerous mistakes. This would cost but little money or trouble, and it would greatly enhance the usefulness of the examinations.

can be too trivial. As a matter of fact, it has been found possible to treat, even in Latin, and with a considerable regard for correctness and purity, a very considerable number of subjects more complicated and requiring more reasoning than the maxims of Horace and the allusions of Juvenal. The schoolboy's theme is nowadays a far less contemptible affair than it was. The improvement of style is not, perhaps, in the Latin, but in the greater attention to form. It has been found possible to get themes regularly laid out in little chapters or paragraphs, whether of the writer's, or of the teacher's, design. The exercise may be set with a plan clearly sketched out, and displayed on paper, or with only a few heads, or with a mere statement of the subject. It is tedious to do exactly the same always, and to allow no departure from a fixed type. The old scholastic plan of theme-writing, which many men now alive must have practised, ending like a sermon with a practical application, is not by any means to be despised; however meagre and stiff it may have seemed, it was far better than shapelessness. But it is applicable, perhaps, only to simple ethical subjects, such as envy, or forgiveness, or the fear of death, subjects by no means neglected by those who try to improve ratiocination, but not thought sufficient for the mental dietary. Even with ethical subjects it is desirable to analyse like Bentham, to examine, for instance, the difference between envy and jealousy, to consider forgiveness with reference to Butler's "resentment," to take remedies against the fear of death from the rich storehouse of Jeremy Taylor, and that not without weighing in the balance his multifarious arguments, so as to distinguish between what is, and what is not, fanciful or rhetorical. It should not be forgotten that

boys of promise are apt to prefer fantastic and paradoxical to judicious and truthful writers. If we wish them to be eventually cool-headed, we shall do well to introduce them to Sir Thomas Browne, and Sterne, and Charles Lamb, alternately, with Blackstone, and Mackintosh, and Mrs. Marcet, giving them their heads if they like to write out, in a new form, the whimsies and conceits, provided only they interpret some other time the sobrieties and simplicities. Suppose we have to teach boys who have, as a majority, perhaps, of hopeful boys have, a strong feeling about the divine right of kings, particularly Stuarts, with which feelings are associated many well-known longings and indignations; it is expedient to treat this mental affection homœopathically. In verses, if not in themes, ample verge can be given for the utterance of these transitory sentiments. The corrective can be applied, not directly, but by diverting the young mind to widely different objects, such as the character of Turgot or of Roger Williams, and at another time, by abstracting for translation the calm and plain arguments of a just writer like Professor Smyth. A teacher may be a Whig, and zealous for the faith handed down through the followers of Locke, and yet bear with those transcendentalists whom the best boys undeniably prefer to genuine philosophers. He may forego the right of critically condemning what he knows to be erroneous. But he can insist on a show of argument, on a reason given for the tenets. Make the young enthusiast show cause for his judgments; if not at the time, yet hereafter, he will discover the weakness of the pleading. Give him plenty of truth, or what you honestly believe to be truth, and he will know that other things are false by mere juxtaposition; and he will not cling to misconceptions which have been treated

indulgently. Nor is there anything more to be avoided than undue pressure in attacking opinions held, or pretended to be held, by the young. It is needless to say how unfair it would be from the vantage ground held by the teacher; besides this, which is obvious, there is the mischief done by boring. In a very short time, anything like a parade of ratiocination becomes to people of our race nothing more or less than a bore. A very little pedantry, a slight infusion of Aldrich, a little jangling of the bells of the Positive Church, is enough to set against you the taste and sentiment of the pupil, if you are controverting anything which he is pleased to think he believes. Hereafter there will be logical terms of some sort used as a matter of business in common teaching, and endured as a matter of course, just as the terms of grammar are endured. The authority which is already making "prolative verbs" familiar in the households of many country gentlemen, will no doubt, some day or other, bring into general use some of the compendious expressions with which a Whately would demolish a fabric of illusion; and then it will be a plain matter of business to speak to a boy of elenchus and middle term, just as we now speak of oblique oration. There is no more pedantry in the one than in the other. But at present we are not familiar with many logical phrases. Whately's "Easy Lessons in Reasoning" may perhaps be used in a school as a text-book, or some other manual might be written, more elementary than Mr. Fowler's, on purpose for schools, and if not wholly intelligible to boys, it would be to a considerable extent assimilated by the minds of the abler teachers, and through them would pass into customary scholastic language. It is even conceivable that an advanced class might have bound up in its

grammar sequels to the syntax, resembling an appendix which treats of figures of speech, and containing explanations and examples of reasonings, as well as the elements of rhetoric. Meanwhile, it is here suggested that a classical teacher should, if trained at Oxford, try to keep up his recollection of logic, and look out for occasions in teaching, and particularly in criticizing themes for applying some of the rules of logic. If the art is new to him, as it is probably to most Cambridge men, he should make an effort to master it up to a certain point, examining himself by help of Oxford question papers.

No attempt, however, is made in this paper to put on a semblance of attainments, which the writer has no right to claim as his own. Such success as has been obtained, and it is but enough to encourage further endeavours, is due to no systematic grounding in logic any more than in physical science, nor have the suggestions just given been actually carried out thoroughly by the adviser. The reasoning and criticism found applicable to a boy's school in the enlargement of the old classical course are in some measure founded on books very imperfectly remembered, and on a few chance-sayings of well-educated men, but are for the most part hammered out in practice like rules for making verses and other pedagogue odds and ends. Such as they are, they have interested one or two Oxford men who have been thoroughly trained in logic, and they are thought to have leavened the instruction of some elder boys with something that may protect them elsewhere from delusions.

Philological teaching must be admitted to include etymology. The most old-fashioned classical teacher makes it his business to extort the " derivation " of a

word. He would ridicule such an expression as "a cachectic state of health," because he would know that cachectic is derived from a word meaning "bad" and a word meaning "habit" or "state;" so that it is an absurd substitute for "bad." In some way he would point out that "Toxophilite" ought to be "Philotoxite," and "Telegram," "Telegrapheme;" he would tell you the original meaning of "Pagan," "Bishop," and "Villain;" perhaps he would note with sufficient truthfulness, though not from a right legal point of view, the difference between "Prerogative" or "Privilege" and the Latin words of the same substance. So far, then, we have his authority in our favour, and if we look at the origin and history of a word we are but doing what we were ourselves taught in class to do. But the etymology of thirty years ago was insufficient. It did not guard one against error of more than one kind. Sometimes we err in making deductions, for we all reason in some sort of way, from the etymology, without regarding the deflection of the word in actual use from its etymological meaning: as if we were to argue that an university ought to be open to *all* persons or to teach all sciences, because it is derived from a word meaning *all*. Or we may be tempted to work from one "synonym" to another, forgetting that a word in connexion with other words alters its character as if it were compounded. In writing against trade, an amiable person once argued thus: "Profit" is interpreted in the dictionary "advantage:" to take profit, then, is to take advantage—it is wrong to take advantage of one's neighbour: therefore, it is wrong to take profit. Or again, we infer that a man is a schemer because he has broached a scheme, or a projector (to use a well-known example) because he has started a project.

These sources of error may be usefully pointed out to young persons. It is easy and expedient to teach them also that words are for the most part used relatively, and often have more than one correlative. "Realism" is opposed to "Nominalism;" but it is also used in art as opposed to "Idealism," and in books of education as the opposite of the study of language. "Faith" is sometimes opposed to "Sight," sometimes to "Reason," sometimes to "Works."

It is more important to distinguish between words used in their proper sense and otherwise. "Law" is properly a general command accompanied by a sanction; it is used by men of science to denote uniform recurrence without their intending to imply a sovereign will issuing a general command; and it is well known to students how this change of meaning is disguised in Hooker's first book. There need be no scruple about using words, as we say, *improprie;* only we ought to know that we are doing so, and it is not very difficult to point out this to the readers of ancient books, for the ancients do it openly, and Plato makes us vigilant. "Capital" used to mean in books of political economy the hoard produced by previous labour, applicable to the payment of wages in anticipation of profits, so that it was a positive term; we now find railway directors paying for repairs, not out of their receipts, but by a new loan, which is said to be added to the capital, so that an increase of capital merely means an increase of debt; in this there is no intentional juggling, and the transition is natural enough, but the word is changing its meaning, and it is the business of philologists to watch the change. Nor ought we to be less careful in noticing the use made in argument of common words. "Who rules o'er freedom should himself be free" is a

good line and a sound maxim, surviving the attack made on it by the parodist; yet it will not pass muster as an argument. "Freemen" is used in the political sense, and political freedom is different from natural freedom or moral freedom. In plain prose, the ruler of freemen should be restrained by law, or else their freedom is at the mercy of his caprice; but, if restrained by law, he does not seem at first sight to be free. Yet the line is a good one in spirit; for the second "free" may be taken to mean free-hearted or free from passion—morally free, in fact. Such a play upon words is ornamental, and need not be illusory; but it ought not to pass unchallenged. Two clergymen of great influence have lately preached on Liberty, or Freedom, and have practised, in their use of the word, an elaborate shuffle. The man who holds a creed is above all men free, they say; he is free from doubt, free from fear, free from all sorts of vices. This is simply turning the word "free" into a negative sign; and any one who likes may be as eloquent on the word "not" as these preachers were on "liberty." Their text had originally a plain meaning: St. Paul said that where the men were full of the Holy Spirit, they enjoyed deliverance from the bondage of the Mosaic law. If the preachers choose this plain text for a motto, they may innocently engraft upon it any other doctrine besides that which St. Paul lays down in the context; but this is not exposition of Scripture, and they are as far as ever from having made good their paradox, that absolute submission to a dogmatic system ensures intellectual freedom. Sermons supply an inexhaustible stock of spurious arguments, and are a fine hunting-ground for logical critics. Newspapers also furnish them with serviceable materials. There was a good example given lately by a bishop

of the legitimate fruits of Oxford philosophy. He was arguing about the admission of Dissenters to Universities; it had been urged on the ground that the Universities were national institutions: in what sense national? founded by the nation? founded for the nation? and so on with a truly Socratic investigation which furnished a good illustration of the maxim which the bishop quoted: "Beware of the trickery concealed in general terms," a maxim easily enforced by a classical teacher on hearers of a certain age. Without generalizing, how can we get on at all? it may be asked. Let us by all means generalize, and that roughly, or else we are imprisoned. But let it be constantly borne in mind that from the imperfection of our minds and of our language we can hardly, even by great caution, avoid overstating the generality. He who said that an university was national, was in a great measure right; yet the bishop did well to weigh and probe the term. If we wish for anything like truth, we should generalize provisionally, and offer our theorem to others for trimming and pruning. In no way do young people show their teachableness more than in bearing this retrenchment of sweeping assertions. The candid and patient lads of the Platonic dialogues are with us still; we are not to worry them like Socrates, but we are frequently to remind them of the inadequacy of the grounds on which in practical talk we are obliged for a time to rest. It may here be observed that the Socratic process of questioning, besides being excessively tedious, would seem to be too much like playing a game; and it has been pointed out already that a lesson which is of the nature of a game is good only for young boys, not for those who are on the verge of manhood. One may, no doubt with advantage, talk Socratically for a minute or

two; for instance, "You do not believe in witches? Why not? Because none of your neighbours do? Then, if you had lived in the Middle Ages, you would have believed in witchcraft?" and so on, but only a little way. It is better to be content with the simple answer, "I do not believe that God gives such power to any one to hurt those who pray to Him." It is better to do like the good man who, having examined a village school, allowed himself to be questioned and broke down utterly when asked how many legs a caterpillar had, than to lead your Lysis up and down in quest of a solution, and reserve your own belief or your own doubt. Rough and hard exposure of error will do no harm if accompanied by open avowals of one's own knowledge and ignorance; ironical subtlety and evasive scepticism will make philosophy odious.

Without aping the Athenian dialectics, it is possible almost to form in a boy's mind the habit of weighing and scrutinizing general statements and abstract terms. No knowledge of mathematics is needed to know what is meant by defining a term, and a real definition being kept in view as a standard, spurious definitions or inexhaustive descriptions may be tested. A boy knowing nothing of logic, and probably unable to understand Mr. Fowler's Manual, can, nevertheless, perceive what is and what is not a definition, what things can and what cannot be defined. It seems a very important thing that boys should be led thus to apply this primary geometrical habit to other branches of knowledge. There are a few definitions in political economy,—though it is, I venture to think, a sham science,—which are useful, if not in practical life, at least in education: since they are specimens of the scientific treatment of things in common life; and it is desirable always to keep the scien-

tific method in view, even when we are dealing with matters which are not reducible to sciences. We must use many terms which we cannot define universally, but they are to be, for the particular occasion at least, held to single meanings, and he that is accustomed to defining is likely to keep closely to his chosen meaning. Besides political economy, every one is aware that in law-books and in legal arguments terms are used with precision and consistency. These terms can be learnt by young people and used correctly; if they do this, they will probably be careful in using political words; and if vigilant in political argument, they will in due time be tolerably self-denying in their use of ethical expressions. For instance, one who has a fairly accurate conception of money, so as not to confuse it with wealth, has gained a step in philosophy: an examination of several scores of boys and girls scattered over England, proved to the Cambridge local examiner that this was not at all an easy acquirement, and yet it has been reached by many students of the classics, whilst engaged in Latin theme-writing. That the right conception is acquired can be proved best by questions elsewhere called problems, such as this: "When a ship is wrecked and the cargo is insured, is it correct to say that there is no loss sustained?" If they answer that the underwriter sustains loss and no one else, they have not learnt to think correctly of money and wealth. Accustomed to such topics as these, a boy of superior mind might be asked to compare two apparently conflicting dogmas: "Virtue consists in conforming to nature," and "goodness is not of nature, but of grace." The difficulty of tracing the senses of the word "nature" is here counterbalanced by the special interest which our pupils take in theology; and a rational answer, on paper, may be

expected from many students who have not been trained on any philosophy; but a more neat and precise solution will be given by one who has had some practice in the scrutiny of phrases, and the disentangling of ambiguities. Even if not answered at all, the question can hardly fail to stir the mind a little; and, after it has been set, there will be more listeners ready than there would have been for an explanation.

It has been held by a gentleman of high official authority, that a boy should write nothing that is not to be criticized in his presence; and this excellent principle, if turned into a rule and obeyed, would get rid of a great bulk of papers done in examinations. But it is easy to satisfy oneself that examinations are valuable as stimulants of exertion; and a young person well trained by literary censure will, in doing a paper for marks, act to a certain extent as his own censor. Let it, however, be kept in mind that we use the word examination somewhat incorrectly if we merely read what is written, and assign to it a sort of pecuniary value without censure or comment; and this process should be, as indeed it is, only a rare interruption to the course of training.

Some classical teachers are familiar with a way of studying the Greek Testament which is proved, by the results of many years, to be effectual, not merely in making a few boys do remarkably well, but in bringing a very considerable number up to a very creditable level in ecclesiastical lore. Twice a week, once in a small set of pupils, once in a class of thirty, a chapter, or perhaps less than a chapter, is construed just like a paragraph of Thucydides, but with more discursive lecturing on the substance, with a strict requirement of accuracy in words, and yet with a resolute endeavour

to compass the whole meaning of the whole passage. These may fairly be called catechetical lectures, and they certainly differ from ordinary classical lessons in so far as the teacher gives out more of his own mind and is more anxious to make his hearers think. In such a lesson it would be felt that the desire of reaching the truth was too strong to tolerate any appeal to the vulgar motive of emulation. Of these two weekly lessons, one is accompanied with a special exercise, consisting of short answers, though not always equally short, to some seven or eight questions; this exercise differs from most others in passing through only one inspection, but it is inspected and commented on in the presence of the writer and of others, the oral corrections being often repeated for a succession of boys, so that one is likely to have it really inculcated or thrust upon the consciousness. Now, though the greater part of what is written for these exercises is copied straight out of books, if not worse, and it is on the whole a more mechanical or less intellectual task than composition or translation, nevertheless a considerable number of boys have a certain impression made on them, and show, when examined at the end of a school-time, that there is a certain deposit of knowledge not merely verbal in their minds. Moreover, there have been many cases within recent experience of habitual and unobtrusive industry bestowed upon these exercises, which are not in any public manner rewarded or praised, and do not obviously tend to distinction at school or college. Besides genuine industry of a remarkable kind, there has been a curious and interesting originality, sometimes happily inseparable from the disclosure of a peculiar thoughtfulness and a strong character. But setting aside as irrelevant

the moral charm of these singularly modest exercises, I wish to ask gentlemen of my profession to consider whether they do right in neglecting this method of instruction, I mean the combination of a catechetical lecture with a written paper of questions followed by oral criticism of the answers. Firstly, is not this the right way of teaching Christian literature or divinity? Secondly, is there any reason why this process, which can be proved on the testimony of unprofessional examiners to be successful, should not be applied to other branches of knowledge? And in particular, let those who insist on the substitution of English essays for other forms of composition, ask themselves whether boys are really capable of writing essays of any length; whether they would not be better employed on short swallow-flights of thought; whether they can safely be trusted to go far by themselves without the check of the leading-string; whether there is anything more suited to their age than questions varying in colour and size to be answered neatly and modestly on paper.

Candour requires the admission that to the second of the queries just propounded this reply may be given, that there is no subject but theology in which boys take a sufficient interest for this kind of exertion. Over and above the fact that in Scriptural and ecclesiastical lessons a teacher is greatly supported by the general, if not universal, concurrence of his fellow teachers, and is conscious that he cannot even be accused of indulging a taste of his own, it is evident, on experience, that the boys whose minds are most worthy of culture are more interested in these than in any other studies, except those in which they are consciously making progress, such as mathematics. It is rare to find one who cares for political philosophy, and even a select class

soon tires of a first-rate book of the Burke or Guizot type; it is not rare to meet with one who enters into controversial divinity, who reads week after week without weariness Dr. Wordsworth's "Patristic Commentaries on St. Paul's Epistles," who will listen with animation to fine passages of Hooker, or Edward Irving, who will take Church history and hagiology in any form and to any extent. This is in truth a literary teacher's widest and most fertile field; and for that every-day kind of reasoning, which consists of testing assertions, cutting down exaggerations, dissolving rhetorical compounds, appealing from text to context, and establishing the inestimable habit of considering two things at once, one needs no other materials than those supplied by Churchmen. It is indeed melancholy to observe how ignorant clergymen are of ecclesiastical biography, an ignorance which can be justly traced to colleges and so back to schools; nor is there any branch of literature which he, who has in these pages undertaken to speak in favour of early philosophizing, would more zealously encourage. But it seems to be the duty of a master in a public school to serve his country by keeping up the stock of Englishmen who may sustain that beautiful fabric of English justice and beneficence, which is to our modern world the pillar and the cloud; and an Englishman is not merely a member of the English Church. Our justice and beneficence are plainly based upon jurisprudence, and ethics, and politics; and if their principles are to be held firmly, and secured from passion and caprice throughout a manhood immersed in worldliness, there is no time to lose even at school in studying the philosophy of government, the duties of citizens, the grounds of the ethical creed held by society. "These are not topics for boys." Nay, but you cannot

help their being handled by boys. For they read newspapers habitually. And if, as it follows, they are familiar with questions of morality and polity, who will deny that they need critical, I do not say dogmatic, instruction in morality and polity?

It is perhaps necessary to remind some readers that the schoolboys of whom we are speaking are the select leaders of great schools, and are equal in capacity to the first-year men of second-rate, if not of first-rate colleges. They are, it should be remembered, of the same age as the freshmen or even the junior Sophisters of the last generation; and I believe they are not younger than the ordinary students of Scottish universities. A few years ago, a lad taken from an English public school before he had finished his course found himself at Edinburgh writing, instead of verses and themes, English essays, which were read and criticized by Sir William Hamilton. It appears that the essays were too numerous to be all treated respectfully; they were not read in the presence of the writers; but, some time after they were shown up, the professor addressed the whole class on what he had noticed in some of their papers. It would seem that these were but hasty and boyish writings; but the evidence goes to prove that one who would have been a sixth-form boy at a school, was, as an university student, brought loosely into contact with the mind of a philosopher. In Professor Browne's well-known Lectures on Moral Philosophy there is hardly anything that would not be intelligible, and there is much that would be interesting, to elder schoolboys. There is a great deal of Adam Smith's "Wealth of Nations" of which the same may be said; and the same experiment has been tried on Mr. J. S. Mill's "Political Economy," omitting about two-fifths of it. Many

other books might be mentioned, and indeed some have been named already, as supplying materials for Latin writing. But it is enough to refer to one book in particular, which, if I remember its contents rightly, shows what might be the sort of philosophical preparation made by a very young man for legal and parliamentary labours, "The Life of Francis Horner." The name of this really well-educated member of parliament is, it may be feared, not familiar to men engaged in teaching, perhaps not to politicians. But it will be found historically true that he was, though short-lived, singularly useful to his country, and that the influence he had in the times of Canning was due entirely to his philosophical temperament and philosophical power. His memoirs show with considerable fullness who were the authors, domestic and foreign, whose researches and discoveries he studied. Some, perhaps, of these books are now almost obsolete; others are still worthy of respectful perusal; but it is in the habits, aims, and methods of Horner, not in the very books he read, that we are to find an instructive pattern. When the Cannings were attending merely to "belles lettres," and probably never employing their understanding on anything at all difficult, the pupil of Dugald Stewart was reading, as a law student reads, that is to say, digesting and mastering, the best treatises on jurisprudence, politics, and the cognate theories. And it is to the Edinburgh men, more than to any public school or Oxford or Cambridge men (unless Oxford and Westminster take credit for Bentham), that we owe the enlightened legislators and the righteous government of the last forty years. I do not say that we owe all this to the Edinburgh men only: there is a confluence of causes. But, if we can trace good statesmanship to

good education, this is the line of descent; and if we ever had an educator, it was Dugald Stewart.

It must be readily admitted that what may be called, in compliance with the customs of the enlightened Scotsmen, "moral philosophy" belongs on the whole to a university rather than to a public school course of instruction; and it is in a great measure with a view to preliminary training for Oxford that a few hasty inroads have been made by schoolboys across the border into the land of fatness. There was a time, now far withdrawn into the archæological period, when at Cambridge also encouragement was given to ethical and metaphysical pursuits, and there are traces still to be found of the system. But it must be remembered that no mere demonstrative teaching, or popular lecturing, nor this combined with a few prize essays, nor these two combined with the addition of a book or two in the course of three years to the subjects of college examinations, can be expected to secure accuracy, precision, and all that we pique ourselves upon in the classical method. Either the classical method itself, or something analogous to it, should be applied to the study of "moral philosophy" with its adjuncts: nothing less critical or less stringent will be satisfactory.

To repeat what has been already indicated, the traditional method of teaching classical literature, which we call, for brevity, the "classical method," consists of "composition," or written exercises minutely inspected and altered, and of "construing," with "parsing," and with etymological analysis beyond what is known under the name of parsing. This is known to constitute a real discipline, and it is for this reason that men honestly adhere to the old grooves of Greek and Latin. It is from a wholesome horror of sciolism that they cling to

what they know to be narrow and meagre. Furthermore, it is because they know that students are not generally likely to be diligent unless there is a coercive obligation behind the attractive teaching, that they shake their heads at the missionaries of modern philosophy. There is yet another most important consideration. It has been found in the forty years that have passed since "useful knowledge" was broached and mechanics' institutes founded, that amongst those who are compelled at an early age to enter into lucrative business, and have but little spare time for mental cultivation, those studies thrive most, if indeed they are not the only studies that thrive at all, in which one is able to feel that one is "getting on." In other words, those branches of instruction wither in which young people are but hearers and not practitioners. The students at mechanics' institutes prefer something that is of the nature of an art or craft, in which they can measure from time to time their own proficiency. So it is with the leisurely class which supplies the upper forms of a public school. They also have their business, though it is far from being lucrative; they are for the most part working at athletics, and school with them, hardly less than with young artisans, is restored to its old Greek meaning of the time that they can spare for mental improvement. And if you ask them to add to this time by taking something from the cares of the world,—that is to say, from what we are wont to call their amusements,—they will make the sacrifice more readily for the sake of a progressive study, especially for entering on a new department of mathematics, than for the purpose of merely reading a book or taking notes of a lecture.

This desire of perceptible progress in the acquirement

of skill is satisfied to a certain extent in the practice of composition. Probably it accounts also for the zeal which for some generations the young Romans displayed in practising declamation,—an art which, if they were consistent, the admirers of antiquity would revive. But oral disputation is too much like playing a game, and we have long ago distinguished between the puerile play of the mind and the calmer pursuit of truth, which is becoming to early manhood.

The classical method, characterized by accuracy, by constraining and chastening discipline, and by some consciousness of progress in the acquirement of craftsman's skill, we would, if possible, apply to what we have called, for the sake of convenience, moral philosophy. And this we would attempt in the last years of school life, relegating to the universities the technically logical method, or at the utmost combining with the classical method only so much technical logic as can be either attached to syntax or thrown into a popular manual like Whately's "Easy Lessons." Now, can any one help us to a practical plan for adapting this discipline to English books? It is easy to say that we are to write English essays, but how are you to prevent the schoolboy's essay from being either a mere transcript from a book, if done in the absence of his teacher, or a rambling and shallow tirade, if done without books in a schoolroom? I must personally avow an impatient weariness when my friendly advisers plead for English essays. As an occasional effort, the essay is good enough; for instance, if a class has been reading the Annals of Tacitus, you may at the end of the school-time shut them up for an hour or so to write an essay on the character of Germanicus, or on the growth of imperial absolutism. That is to say, the essay serves fairly to

try a boy's intellect in a rather longer flight than usual, and over historical ground it will fly tolerably straight. But, by the supposition, we are looking for something that cannot be treated merely as history. We need something that will bring out in shape and form something like a view of a philosophical topic. We need an exercise which cannot be written quickly, which is sure to give the censor plenty to do, which will bring two minds, the older and the younger, into stimulative contact, which forces us to distinguish between the thought to be expressed and the manner of expression. The use of the English language by itself has been, if I am not misinformed, tried and found wanting in Scotland and in New England; the fruit of essay writing has been shallow and tasteless fluency. Men of genius, with an academy to formalize for them, might have made the English language a classical language, and it might have been brought to pass that, as a Frenchman studies French and learns how to write French as an art, so an Englishman might have found a discipline in his mother-tongue. But at the best this would, for scholastic practice, fall very far short of the use of a second language. That part of the paper work which we call translation, whether in the form of epitome or at full length, must be foregone by the English essayist; and we should be left to the cyclic monotonies and platitudes of that " original composition " which school reformers dislike. Paltry as original composition in Latin verse may be, it would be a relief after the amorphous garrulities of the young essayist. And, though no doubt we can do a great deal in the etymological analysis of English words, which has been already touched upon as an unfathomable mine of knowledge fit for schools; yet we should miss the

parsing; for no ordinary schoolmaster can find a nourishing diet in English syntax; and it is obvious at first sight that, unless we read Mr. Carlyle's works, there could be no "construing."

I have challenged the friends of modern philosophy to devise for schoolmasters an adaptation of the classical method, plainly averring that we cannot be content with an offhand exhortation to English essay writing. In default of any hopeful proposal from gentlemen who are not themselves teachers, I would ask the reader's attention to a suggestion which was made several years ago before the Public Schools Commissioners, and which subsequent experience enables me to repeat with more confidence. It is briefly a proposal to substitute the French for the Latin language as a vehicle of youthful thought, and to resort to French instead of English books for the study of the rudiments of science and philosophy, with a preference of historical dissertations to formal treatises. It seems certain that the oral part of the classical method is easily transplanted in its integrity to the French language, which is, moreover, taught more solidly and effectually by simply doing just what we do with a Latin book than in the more elocutional or phraseological way of those who now teach French in England. It seems probable, but my own experiments are not yet quite sufficient to warrant a positive assertion, that the paper work, setting aside verses, can be done as completely and precisely in French as in Latin, with the enormous advantage of overstepping the limits set by the poverty and forced purity of Latin. Dividing paper work into translation, epitomizing or abstracting, written answers to questions, and original composition or essay writing, I speak positively as to the first only, which has been tried for

many years, though not as a matter of universal habit. I have sufficient reason for believing that epitomes or abstracts of French chapters or treatises can be made in English, and I should have no doubt that the converse could be done. Answering questions in French on paper is an experiment hitherto untried, except in matters of light literary history; but there seems no reason why it should not be done with science, history of all kinds, and philosophy. French essay writing has been occasionally tried with success, and if reduced to formal themes would be quite feasible, as soon as the classical teacher had acquired enough knowledge of the idiom to alter freely, an amount of attainment not beyond the horizon of younger men. For a few years there would be a lack of competent instructors, well grounded in mathematics, skilled in Latin and in French. But there is a natural progression up to a certain point which may be reckoned on. The pupils of those who with an imperfect knowledge teach and learn simultaneously will be, when grown up, in advance of their preceptors; a second generation will be nearly competent; a third or a fourth will be as familiar with French as with English idiom. It must have been so with the Latinists of the Renaissance. When Ciceronian elegance was substituted for barbarous Schoolmen's Latin, the first literary teachers were pioneers, themselves struggling with the thorns from which they would extricate their disciples; but a lifetime was long enough to see the complete deliverance of the taste of Europe. Once agree to put French on the footing of the classics, and you will soon get a fair supply of Englishmen able to handle it properly. A year or two spent in Paris, after taking the Bachelor's degree at home, would enable a first-class man to gain a diploma or certificate

of fitness to teach French; and it would be far from disadvantageous to schools if this delay were secured, and this addition made to the young teacher's stock of wisdom. It might be required of some men that they should have become "Bachelors of Literature" in Paris, which cannot be done without passing a strict examination in French. Paris, instead of Rome and Dresden, would be the finishing school for the English graduate who means to be a teacher, and the time now bestowed on art would be almost enough for the rudiments of science. Art is strong enough nowadays to take care of itself; and it may be doubted whether it has not, in the form of superficial connoisseurship, made some encroachments. At least, one is tempted to wish that more attention was paid by our young graduates to industrial processes and the applied sciences, and one would recommend the occasional preference of a manufactory to a mountain, of Jermyn Street to South Kensington, of handicraft to "bric-à-brac." We deceive ourselves if we think that we become enlightened and accomplished by looking at and talking about the contents of galleries and studios. We are not less mistaken if we imagine that we have acquired a modern language without having read much or composed at all. If sincere in our wish to be more thoroughly furnished with knowledge than were our classically trained predecessors, let us submit to being drilled and examined by foreigners, and by foreigners of authority and independence; we hardly get the truth from those whom we engage as language masters, for they flatter us.

The leading schools are in a position to demand these increased qualifications of those who wish to be on their establishments as teachers. It would not be unreason-

able to go so far as to put off the final appointment of an assistant-master till he had reached the ordinary standing of a man called to the bar, and had gone through as laborious a preparation as the law student. Hitherto our authorities have affirmed, and not without some grounds, that a young man called from college to take a form, or even a house, in a school, will, after the commencement of his professional labours, take care to improve himself and supply all deficiencies. But, in fact, little is added beyond a smattering of modern languages and dilettante culture, which it would not become him to despise who confesses his own sciolism, but which he may, as a patriot, wish to see replaced by solid and well-proved acquirements. Others have lamented the slenderness of the outfit with which young English gentlemen leave school; a schoolmaster may in his turn lament that society, which is above and around him, is itself content to fetch so little from European capitals, and, in particular, that it is satisfied with so partial a survey of the magnificent literature of France.

In this paper there has been indicated a certain respect for the lucid and sober philosophy of the Locke-Bentham period, and a belief that the "middle axioms" of politics are wholesome food for students on the edge of manhood. The "advanced liberals" of the present day are, I believe, dieted upon intuitions which make them think Whig and Scotsman insipid; and fashion is against what is called the eighteenth century. But it is generally held that a certain economy must be practised in teaching the young, and that we may safely stop short of the latest modernism. It is argued in favour of the classics that they are sphered on high out of the range of party storms and prejudices; and if there is

any force in this argument it applies to some of the writers who have a European reputation, and are not arrayed in our controversies. I find amongst the writers of France since the Restoration, including the Belgians and the Swiss who write in French, men who combine the sanity of Robertson with the moral loftiness of Burke, and who, because they are Frenchmen, have none of our badges fastened upon them. I would read these as I read Cicero and Tacitus, mainly because they teach political virtue, and teach it intelligibly as well as loftily. But this is not the reason on which my thesis allows me to dwell. I recommend modern French books because they are rational, and indirectly scientific: if not on science, they conform to the scientific mould. They present to the students models of statement, of limited generalization, of delicately shaded language free from ambiguity, of sentences perfectly articulated, and yet not too obviously logical to cause annoyance. It seems to be true that France, the hotbed of revolutions, has in mental government undergone no violent change; that it has preserved, not without abundant activity and contention, a considerable uniformity; that there is an unbroken succession from Malherbe to Victor Hugo, from Bossuet to Montalembert; that the French have escaped the dislocating agencies of anti-scholastic thinkers; that they are in literature the legitimate heirs of the Romans, and are still displaying the cognizance of Cicero and of Quintilian. Whatever may be their inferiority to the very best English writers, they are wiser than the ancients, and we are looking for wisdom; and the wisdom of the English cannot be by a classical or a critical method of instruction made to filter slowly into the understanding of a young student, whilst the

wisdom of the ancients is not enough to guide a man through the complex duties of our life. As the world grows older there is an increase in the number, as well as an expansion in the range, of what a Latinist would call " doctrines " or " arts,"—that is to say, of bodies of cognate truths with their applications; and if we are to be enlightened men, we must take these, or most of them, synoptically: we cannot afford time in early youth to dwell long upon the curiosities of one particular body of truths, such as grammar, still less on a body of doubts and minute controversies such as what is called " critical scholarship." There is enough grammar in French for coercive discipline and for the shampooing of a dull mind; there is in it etymology, enough to be the foundation of that healthy nominalism which above all things charms us against delusions; there is no textual criticism or conjectural emendation, no worship of aberrant phrases, no love of difficulty for its own sake; there is no film of imperfect sympathy to come between or throw it in several shapes on several understandings. Whether the subject be geology, or commerce, or the English Revolution, or the metaphysics of grace and freewill, the French writer teaches the English reader with no oracular haze between them, and what he states can be reflected without distortion by the interpreter. Seasoned with this rationality, one can go safely to another atmosphere. From the modern books we may go, provided with touchstones, to Plato and Livy, to Thucydides and Virgil; and, whilst revering the intellectual freedom of our heathen forefathers, we may honestly investigate their many errors; using them at once as patterns and as warnings; exposing the shallowness of their inductions, their employment of metaphor instead of argument,

their subservience to abstract terms, the frequent breaking down of their rhetoric, their countless fallacies of observation, and the barrenness to which they were condemned by the estrangement of their literature from science.

CHAPTER VI

THE CASE AGAINST THE CLASSICAL LANGUAGES

BY H. G. WELLS

THERE has recently been published "A Defence of Classical Education" [1] that has been greeted very widely and very loudly as an admirable statement of the conservative case in educational affairs. It may therefore be taken as a representative statement. It is an ably, if sometimes rather floridly, written and thoroughly interesting little volume. It is presumably as good a defence as can be made; and it is worth while, therefore, to take it up and examine its reasoning carefully. Is it a valid defence?

The attack upon classical education, it must be remembered, does not involve a discussion of the value of that education; it is an attack merely upon its exclusive predominance. It is alleged by the assailants of that predominance (*a*) that it is possible to be highly educated in the best sense of the word, to be as highly educated as it is possible to be, without any study of the Latin and Greek classics in their original tongues; (*b*) that the favouring of these particular studies by such preferences as are given them, for example, in the Higher Division Civil Service Examinations, hampers the development of collateral

[1] "A Defence of Classical Education," by R. W. Livingstone. Macmillan, 1916.

systems of higher education and produces a narrow and stereotyped class of public servant, frequently very ignorant beyond his special range; and that (*c*) the great advantage given to these subjects swamps the time-table of our schools, even for those who will never go through the complete classical course, with the elementary study of the Latin and Greek languages, to an extent that cripples any successful attempt at an alternative education. These so-called "anti-Classical" educationists demand only the removal of these handicaps upon a non-classical education. They propose no interference with classical education as such. But they want to give modern education a fair chance. They ask for the exclusion of Greek and of more Latin than is necessary for the understanding of English from the general university curriculum—let the careless reader please note the word "general" here—and for such a revision of the Civil Service Examinations as will deprive Greek and Latin scholarship of their present excessive value in the career of an ambitious public servant. This, cleared of side issues and only partially relevant considerations, is the attack to which the defender of the classical predominance has to reply.

Now it is very rarely that "pro-Classical" writers stand up quite squarely to this attack, and Mr. Livingstone does but follow a prevalent custom in fencing rather distractingly away from the essential issue throughout his opening chapters. I would not accuse him of any forensic motive in doing this; I believe it is rather the quality of his training than of his mind that makes him play over this question instead of gripping it. It must be fairly clear that the whole attack fails or holds good on the failure or establish-

ment of the proposition that the highest education is compatible with a practical ignorance of the classical languages, with "little Latin and less Greek," and that all the rest of the discussion follows upon that issue. If that proposition is true, then there is no case for Greek or for the study of Latin for its own sake. But Mr. Livingstone, rather arguing like Mr. Bernard Shaw than reasoning upon the matter, begins exasperatingly with a fancy explanation of ourselves to ourselves, discourses upon our present discontents, tells us that "self-criticism is a constant trait of the Anglo-Saxon" (if only it were !), explains how the classics are made "scapegoats" of, refers to the performances of the Ministry of Munitions (under that eminent classic, Mr. Lloyd George) as a proof that our science and education aren't "as bad as some people suppose," and wanders on to such facts as that classical education is predominant in Germany, and to quotations in favour of a classical training from various eminent German —"scientists." (It is a questionable word, that "scientist"; it belongs properly to the reports of boxing contests if it belongs in English at all.) As, however, a great number of less well-informed classicists are warning us against sinking down to the materialism of Germany by the abandonment of humanistic studies, it is well to have this admission. Mr. Livingstone also throws out the opinion, which I welcome, that the chief faults of British education are, first, that it does not make us value knowledge properly, and, secondly, that there is not enough of it. And at length, with an air of pulling himself together, he announces certain "stock objections" which he will presently meet and slay in passing, and so makes an end to his introduction and begins. These stock objections may very well be

ignored here in order to keep the main discussion clear.

This main discussion Mr. Livingstone opens by making an opposition that no sound educationist will accept for a moment between "Physical Science" and "the Humanities." Within a page or so he is talking against "paying subjects," asking what "physical science" teaches us about the causes of the war, implying that "physical science" does not stimulate the imagination, failing, of course, to define "physical science," and going off in half a dozen different directions, so as to be for the grimly pursuing critic less like a quarry to be cornered and settled than a pack of cockroaches fleeing before a light. By p. 54 or thereabouts one is no longer hopeful of a stated case; one is turning over the book to find what is in Mr. Livingstone's mind, to clear up, not what he is saying, but what he thinks he is saying about education. He has never defined either education or "humanities," it is manifest, even in his own mind; it is only too clear that, in spite of his reiterated claims that lucidity of thought is almost impossible without a classical training, his own education has failed to give him the habit of looking into words and phrases for their meaning before using them. He flings these locked boxes about without a suspicion that he does not thereby handle their contents. He thinks in *cliché*. It is absolutely necessary, therefore, before one can go on with this discussion, to go a little outside Mr. Livingstone's book in order to get a simple statement of what education is in terms upon which we can meet.

Now I put it to Mr. Livingstone that there is really very little difference of opinion at the present time among people who think about such matters upon

what are the essentials of education. Education, which begins with the beginnings of speech on the mother's knee, is first and primarily *a training in expression*, a training in methods of intercourse, under which heading we may put drawing, mathematics, languages, logic and so forth. And next, as the individual grows up, it becomes also *a training in understanding*. The world and his fellow men have to be understood; and a good education gives him all that can be given him of what mankind has made out about thought and about its own nature and destiny. That is to say, he is given philosophy and history. These two phrases constitute all that we can call education in its stricter sense. Mere *equipment*—the teaching of bookkeeping, for example, or of a language for merely commercial use, or of the technique of a trade or an art—may be educational incidentally, as indeed almost all experience may be, but it is not strictly education. Nor is the increase in a man's acquaintance with art strictly education. Æsthetic and emotional experience are alike a part of living and of the complete making of a man, but they are no more fundamental to his education than the society of wise friends or pretty women, or the cultivation of a fine palate for wine, or a fine discrimination among cigars. Beautiful writing or painting may also be great and ennobling, its inspiration may be the more effectual because of the light of its beauty, but it is educational by reason of its thought and illumination, and not by reason of its beauty.

I would apologise to Mr. Livingstone for writing down these educational commonplaces so explicitly were it not for the manifest fact that he has not clearly grasped them. He has never got to any statement so comprehensive as this. Instead, he produces this vague

expression, the "humanities," seems to define this expression as history, philosophy, and literature, and cites as their triple function that they are, firstly, to assist us in the knowledge of Man (with a capital); secondly, to develop flexibility of mind, by which he means a capacity for understanding the point of view of others; and, finally, to use his own phrase, "to help us to see the world with imagination." About this latter expression he is picturesquely evasive, and I have great difficulty with him; he becomes eloquent; he becomes mystical; he coruscates with literary platitudes. It is being lifted "for a moment into the golden clime." It is seeing the "secret beauty and inner significance of things." It is—to be plainer—never hearing a skylark without raining out quotations from that poem of Shelley's, and never looking at a tripod in a chemical laboratory without rolling the eyes and murmuring "Delphi!" That, at any rate, is the conclusion to which his instances drive me. It is as bad as never getting chicken without salad. It does him little injustice to say that he means by this "seeing the world with imagination," seeing it *tagged*; looking at life unsteadily with one's head swimming with fine remembered phrases. But, at any rate, he does grasp the importance of philosophy and history in the higher phases of education. All good philosophy and all good history are literature; history cannot be divided off very easily from either natural history on the one hand, or biography and imaginary biography on the other; but Mr. Livingstone, with his invariable looseness of thought, writes of "literature, history, and philosophy" as a threefold group constituting the "humanities." I submit he is only stating less accurately what I have already stated

above, and that this addition of "literature" is tautological and redundant. So far as literature is educational, it is covered by a generous use of the terms philosophy and history; so far as it is not to be covered by these terms—as, for example, Coleridge's perfectly beautiful dream fragment—

> "In Xanadu did Kubla Khan
> A stately pleasure dome decree."

it may be a matter for joy, but it is certainly not an essential matter in education.

Having thus cleared the ground, we can begin to distinguish the exact question at issue and to state the case which Mr. Livingstone never does more than imply. This case, when we get it into the daylight, amounts to this: that philosophy and history, spreading these two terms out to cover the record, the analysis and the experimental and quintessential statement in poetry and creative writing of the world's way and of man's way, can be got at better through the Greek and Latin languages than through any other approach. The case against him is the denial of that proposition, the assertion that philosophy and history can be studied as well, and indeed more thoroughly and surely, in the mother-tongue as the medium of statement and discussion, and the deduction that both Greek and Latin are therefore unnecessary to a complete liberal education. It is ultimately entirely a question of language, of medium. The merits of the Greek and Latin classics, the achievements of the Greek and Roman peoples, the value of ancient instances, do not enter into this discussion—so far as such things are available for educational purposes through works in the mother-tongue and translations into modern speech. By the

time Mr. Livingstone is a fifth of the way through the book he begins to touch, though very unsteadily, upon this real question at issue. He approaches his obligation, which is to show that Greek and Latin are unsurpassable and practically untranslatable media for philosophical and historical thought.

Now when I come to ransack Mr. Livingstone's chapter on "The Case for Greek," I find myself in the perplexing position of an antagonist who, having come out with a certain air, has nothing to answer. His "case for Greek" is nothing but a sustained eulogy of Greek literature, which is entirely beside the question. We are not discussing the case for Greek literature; nobody wants to deprive a single undergraduate of such crumbs of Greek literature as reach him now. Indeed, most of us would gladly give much more Greek literature—finely rendered into the English tongue. But Mr. Livingstone must go about this business in his own way. Among other outcries I read, "Greece is the ferment of the intelligence quickening, permeating all media with life." Mr. Livingstone can follow this up with the remark that, "Reason to the Englishman suggests something bloodless and wizened, generally embodied in strange and unfamiliar language," and still fail to see the connection of this with the plain fact that whereas the whole Greek community was thinking in the same language, the university Englishman still persists in a toilsome endeavour to think in a language other than his own, dreading nothing so much as the market-place. Mr. Livingstone can quote and orate through half a dozen pages about the Greek Reason being "not a mere intellectualism watching the world from a study," but "an ardent desire reaching out into all provinces

of life," without realizing for a moment that he is doing his best to keep the English Reason imprisoned and aloof in the narrowest sort of study conceivable.. I turn on from this futile chapter to "The Advantages of the Classics," and here I do find at last an assertion, gathering boldness, of the extreme clearness of Greek speech. He compares it with the English (and German) of philosophical writers who have approached philosophy through Greek, and he shows that they write not English but jargon. "The Greeks walk on the real earth," he says, "or something like it; in modern phraseology, we seem to be among unsubstantial cloud shapes." "Naturally!" I answer. That is the effect of Greek studies upon the English mind. And no one who wrote of philosophical questions in plain, clear English would ever get a sign of recognition in academic quarters. Mr. Livingstone is not even aware that there is any philosophical discussion going on in England at the present time in any other language than this jargon. His instances of the badness of English are taken from *Times* leaders and academic writers; they are really merely instances of bad English. When Dr. Rashdall writes "the hedonistic psychology involves a hysteron proteron," he is merely "niggering" with long words for which he knows no proper English equivalent, and it is absurd to contrast this bastard speech with the concrete philosophical terminology of Greek. If anything, it is an argument for compulsory English at Oxford. After this gleam of genuine discussion Mr. Livingstone lapses again into his mere chant of the praises of Greek literature, and the pursuer must read on into Chapter VI. before the question at issue reappears.

There at last we seem to get Mr. Livingstone in

his corner; he is up against the language question at last. But now it is chiefly the clearness of Latin he commends, and in commending betrays the fundamental weakness of his case. He takes the following text to show the "precise expression" of Latin: *Sex iam menses durante obsidione, ita ut frumentum deficeret, consul Capua egressus oppido ferre auxilium paravit.* This is a very easy "unseen." The English of it is manifestly, "As food was running short, the siege having now lasted six months, the consul set out from Capua to carry aid to the town." But Mr. Livingstone gives a poor, weak, incorrect translation: "The siege had lasted six months and food supplies were running low, when the consul left Capua and set about the relief of the town." And then he goes on to criticize this incompetent rendering as if he was criticizing the English language—

"Note as logic how vague, and even inaccurate, the English is. The main thought 'set about' is actually in a subordinate sentence, and even there nothing in the grammar indicates that it is more important than 'left.' 'The siege had lasted . . .' and 'food supplies were running low' are constructed as two main verbs, as though they were of equal importance in the thought. But Latin sifts them all out, seizes the main thought. . . ."

But, indeed, this proves nothing except that Mr. Livingstone has a very poor sense of good English. Manifestly he does not know what can be done with that instrument even in so simple a matter as this, and this is a particularly unfortunate revelation for him when he is adjudicating upon its relative merits and necessarily asking the reader ignorant of Greek to take

much that he says on trust. Mr. Livingstone himself does not, it is true, write bad English, but he does not write it very well; he is sometimes rhetorical and rather given to the commonplace phrases and *clichés* of the schoolmaster; translations, for example, are "these much abused exercises," and the experienced examiner is "anyone who has had the misfortune to spend time in examining." But very many classical scholars write English atrociously. Some years ago the headmaster of a well-known public school wrote a paper of weak, ill-arranged, and occasionally ungrammatical sentences to state his conviction that without a knowledge of Greek and Latin it was impossible to write good English. I discussed this indiscretion at the time in the pages of the vanished *Independent Review*. Such instances very gravely weaken these last positions of the defenders of the classical language burthen. If these men do not use their own language nicely, if they miss its subtle opportunities and reason in English with a blunted edge, we are left sceptical by their enthusiasm for the unapproachable subtlety of two languages which, after all, they cannot possibly know so well nor use so freely as they do their own.

And from this fact that there are these philosophers and scholars with a sort of disconnectedness between their untestable but alleged exquisite Greek and their very loose and ordinary reasoning in very commonplace English, I would go on to certain other considerations that do not seem to have dawned upon Mr. Livingstone at all. The fact that they fail to bring the treasure over into English is the last most fatal flaw in their very flawed case. Let me assume the rôle of Paterfamilias. I want my boy to be as highly educated, as well educated, as possible. He is, if I can manage it,

to be an illuminated man. His philosophy and history are to saturate his mind and his life—his whole life. Nothing is there that Mr. Livingstone can write in praise of the humanities that I will not endorse. But my boy is English; he is going to think in English, and he will not do that well unless he has exercised himself in every possible use of our most flexible, beautiful, expressive, and very difficult tongue. He cannot afford to keep it only for the meaner uses, because it will be necessarily the medium of all his private thinking. Greek literature may contain the most marvellous intellectual yeast, but it is no real good to him until it is fermenting and reacting in that flow of English thoughts and ideas which will be the essential him. I do not want him to go off for private mental exaltation into a study, and come out once again not even trailing clouds of glory into his everyday life. Such learning is no better than opium. You see that from this point of view, what cannot be translated or annexed into English from Greek is no real good to him at all. At best an unassimilable Greek corner of his mind, however high in tone, can be little better than a sort of secondary personality in his life. Rather would I have him drink from the classical spring as Keats or Shakespeare did, through translations, than as Dr. Rashdall has done. So I am seeking very earnestly for a philosophical education for him, for a vision of the world and himself, that is, *in English.* French and German he has had from his governess; they are the two keys to all the Western tongues, and for the gymnastics of translation and a different idiom of thought there is Russian. And, dropping the Paterfamilias again and reverting to the citizen, I want as earnestly to see my country and my English-speaking

race thinking more massively than it does at present, thinking more strongly and clearly. I want to see the hundred and fifty millions of English-speakers as one great unifying mind finding itself in expression. I do not want to see what should be the best thing in our university life, the philosophical teaching in the universities, the teaching that attracts the best intelligences of the country, perpetually cut off from the market-place because it is reading Greek, thinking partly in Greek and partly in English, with a partition between, and writing its thoughts sloppily and confusedly in an Anglo-Greek jargon. And as I close Mr. Livingstone's book, with its frequently weak arguments, its discursive assertiveness, its quiet neglect of the great necessities and opportunities of this time, I find it hard to believe that this defence of his—and he had probably stated his case as well as it is likely to be stated—can have the strength to hold out much longer against our urgent need. These Greek monopolists have to get their trade and their prejudices and privileges out of the way of our sons and our people and our public services. It is their share in the sacrifices of these creative days.

CHAPTER VII

A MODERN EDUCATION

Report of a Speech delivered to the British Science Guild at the Mansion House

BY H. G. WELLS

You have heard two speakers admirably equipped to speak upon this question of National Reorganization. The task for which the promoters of this meeting have commanded me is different from the one these two have discharged. You have heard Lord Sydenham, a great administrative statesman, you have heard Mr. Fisher, a great educational statesman. My rôle is to speak as an outsider with no administrative or constructive experience at all. My rôle is to give you some of the outside impressions of one of the governed. I am here to speak as the average intelligent man who looks at this and that from outside. I have three separate reasons for interest in this question of educational reorganization. I happen to be an old schoolmaster—I was a schoolmaster in those years of one's life when one takes up things with enthusiasm. I am a parent who has followed very closely the education of his boys and has attempted in one or two instances experiments with them. And finally I happen to be an Englishman who has a passion for his country, who is anxious to see it, not perhaps very wealthy or very much greater from the point of view of aggran-

dizement, but as playing a noble part in the great years of human unification that are ahead of us. All these things combine to make me a fanatic for education. It seems to me that in all these questions of reconstruction you come round to education. When you talk of commercial prosperity, political organization, national unity, military efficiency, it all finally brings you back again to this one cardinal question. It is the ring upon which all the keys of national greatness hang. If education is right, all is right. Now I have watched the work of education in England from the outside—and sometimes an outsider has a certain advantage—for the last thirty years, and I want you to bear with me when I say that all is not well with education in this country and that it seems to me there is a specific cause, and a cause that is not so clearly understood as it should be, which lies at the root of our educational deficiences. If this cause is attended to all may be well. Its treatment opens the door, anyhow, for every other sort of possibility. If it is neglected, shirked—and in certain quarters I have seen signs of shirking at the present time—then nothing will be well, whatever you do. You who are members of the British Science Guild are exceptionally aware of the symptoms of the disorder of education in Great Britain. You are aware of the criticisms brought against the mentality of this country. We are told there is a very wide neglect of science; there is a contempt for knowledge for its own sake, and arising out of that there is infinite waste, there is planlessness, there is a habit of "muddling through," which has at last brought us extraordinarily near to a crisis when it looks as though we should hardly muddle through at all. Many of you think the whole trouble is met by

saying that what is the matter is "want of science": that if we had more science teaching, more endowments of scientific work, more intelligent organization of research and a more general interest in science in the country, then all would be well—that that is the trouble, and that that is how it is to be met.

Now here it is that my use as a teacher of experience, as a parent of experience who has been looking into the education of his boys, and as a journalist who is frequently getting into discussions, comes in. I do not think your diagnosis gets down to the roots of the case or that your remedy completely meets the occasion. None of these things that you want can possibly be got by themselves under existing conditions, First, you cannot have more science teaching at present because the school time-table is full. Next, you cannot have much more or much better research than you have at the present time because the ablest boys in better-class schools are being steadily taken away to other things, and you have not got in the community enough understanding of the nature and needs of research to establish and endow it properly. Thirdly, you cannot get a more general interest in science at the present time because you have no class of persons to get the general mass of people in touch with contemporary scientific work; because scientific men are, generally speaking, scientific specialists, ignorant of philosophy and literature, and without any bridge between them and the man of ordinary education. (Laughter.) No, don't laugh. These are serious things. The ordinary man cannot reach the mind of the scientific specialist, and the scientific specialist cannot reach the mind of the ordinary man. There is a gap in our public mentality at the present time. It is by no means a comic gap.

Let me begin by saying a word or two about the first of these troubles, the one at the root of all the rest, the crowded time-table. I was thrown into a violent rage the other day by a book called "Science and the Nation," a compilation of essays by a number of Cambridge science teachers advocating an increase of scientific teaching in this country. What threw me into a rage was an unfortunate phrase in one of the articles. One of the contributors spoke of the "ample leisure of the school-boy," and expressed a hope that there would be plenty of time for both classical and scientific men to get all they wanted into the education of our youth. Never was there a more unfortunate phrase. There is, I can assure you, as teacher and as parent, no time whatever to waste in the education of the young, no "leisure" at all. In no matter is economy more imperative in this country than in the time of the young. For the first time we in England are really grasping the idea of economy. At present there is a shortage of bread, but that is only temporary. But there is always a shortage of time for education. No year in a boy's life is like any other year in that life. Each year has its task and its opportunities. If you don't teach a boy to walk before he is three, he will never walk; if you do not teach him to talk before he is five, to draw and read and sew before he is seven, he will have no gift for these things; he must begin mathematics before he is twelve or he will never get on with mathematics; and if he has not got philosophy before he is twenty-one he will always think in a haphazard way. Each year of growth opens opportunities. Each year closes opportunities. Think of the hours available. How much hard study can a boy do in a day? I doubt if he can do much more than four; at the

outside, five. That gives you, allowing for half-holidays, twenty-five hours of hard study a week, and with forty weeks in the school year you have a total of one thousand hours in a year. You are lucky if you get half that of really steady work. Very well; in the case of boys who have been educated from seven to twenty-three—only the most fortunate have that period—the utmost you can hope for is the little sum of 16,000 hours, or if educated from 7 to 16, 9000 hours. For the great majority of the population it comes to 4000 to 5000 at the utmost. Allow for wastage, for bad health, and for bad teaching—and in this country for the next thirty years it is plain common-sense to allow for bad teaching—you get for the most fortunate class in the community, between 5000 and 8000 hours of teaching altogether. Now what have you got to do in that precious five to eight thousand hours? You have to make an educated man, a man equal to modern demands. Let us consider what these demands are. Surely our *élite* must have two or three modern languages, not a large order as far as French and German go, but now there is this matter of Russian. (Laughter.) No, I do not think it is at all funny that we have got to learn Russian. This community of ours must get on terms of understanding with the great Russian community. It is a staringly obvious political necessity. Unless a number of our better-class boys talk and understand Russian, our relations with the Russian people must be conducted very largely by political exiles and friendly Germans. Very well, if you do not like that you must have Russian in the curriculum. Then there is mathematics. In this mechanical age it is ridiculous that our ruling class should not have a good mathematical training. It is as necessary for

the gentleman nowadays to understand a machine as it was in the old days for a knight to understand his horse. Next comes the history of mankind, the history of the universe—you want your boy of the better class at least to know his place in regard to the world, to mankind, and the past, in order to know his relation to the task in hand. Philosophy—you want social philosophy and a great deal of political philosophy, though for the great mass of our ruling class it does not enter into their education at all at present. There, let me point out, you have an explanation of the extraordinary difficulty of which we are constantly hearing complaints, the failure not of the workman to understand the employer, but of the employer to understand the workman. Because there is no social political philosophy diffused through this country all our social and economic questions are dealt with in a petty spirit which seems to bring us always before we have got far with them, to a bitter personal class dispute. . . . Lastly, this British Science Guild will not be pleased unless I include some experimental science for the sake of method also in this outline of a curriculum.

That is surely a good filling-up of the 5000 to 8000 hours of the boy's education. That is as much or more than we can hope to do. But let us look at the time-table of a reasonably clever boy of fourteen or fifteen at a public school. We find Latin, Latin, Latin, Greek, Greek, Greek. Because of the traditional ineptitude of the teacher—and it is a traditional subject—not one boy in ten who begins Latin will get to a mastery of that language, and in the case of Greek not one boy in a thousand. There, I think, we come to the real sickness in British education. This ineffective classical

teaching sticks like a cancer in the time-table, blocking it up, compressing and distorting all other teaching. It not only takes time, it takes other resources. It means you must staff your school with men with a highly specialized knowledge of Greek, and the expensive item of a Greek scholar too often means a cheap Science master. You may say there are two sides to a school, the Classical and the Modern; but as a matter of fact all boys are on the Classical side until they specialize. Only the other day I had to interfere in the case of a boy destined in a year's time for the Modern side who was solemnly beginning Greek. What for? Even in the most modern public schools the classical teachers are picking over the boys, and any boy who can possibly be saved from the Modern side and kept on the Classical is so kept. If you doubt this, read Lord Bryce in the April *Fortnightly Review* on classical studies. In these matters he is counted as a very moderate-minded man, yet he treats it as incontestable that the classical studies have the best claim upon the best boys—and also, if you read his paper, upon the best administrative posts in later life. (Laughter.) Read Mr. Livingstone's "Defence of the Classics," and you find the same thing, a calm assumption that before boys go on to Science they must be picked over and the best ones taken for Classical work. You may say all this is going to pass away. It is not going to pass away without a bitter struggle. The Classical people have got hold of the schools and the universities. The whole country may feel the inconvenience of them, just as the whole body feels the inconvenience of a cancerous growth. But it won't cut itself out; it has to be cut out. (Laughter.)

Now let me develop this question a little further. I

have to say a little more because this distortion of school work by Greek and by excessive masses of Latin is only the lower level of the evil. At present Greek is the shibboleth for admission to Oxford and Cambridge. I admit there is a war relaxation at present in Responsions and "Little-go," but we are not sure it is permanent. Suppose we get that barrier of compulsory Greek lifted and it becomes possible to go right away from the Modern side of the public school to a Science degree at the university without Greek, is that all that is needed to set things right? I would like to point out to you that it is not. It is only the beginning of the cure, because a specialized education in Science is not a complete education for a man. Let there be a straight open course without Greek from the Modern side to the highest degrees in Science and to research, and your man of Science will still remain a specialist out of touch with the general body of thought. And the men who go through the big schools of history and philosophy, and who will go on to politics, administration, writing, and public guidance generally, will still be out of touch with Science. Why? Because the Greek shibboleth will still bar the way to the study of either philosophy or history, so far as the English universities are concerned. Consider the case of history schools at Oxford, or "Greats," the big philosophical school. In the first you must read, or pretend to read, Aristotle's "Politics," in the latter Plato's "Republic" and Aristotle's "Ethics" in the original Greek. These are the sacred texts without which there is no salvation. You cannot do philosophy at Oxford or history at Oxford without this tribute of your time and life to the Greek language fetish. Now upon this matter I have been conducting a little experiment of my own,

whenever I can get hold of a man who has done Greats. I cross-examine him to the limits of his patience upon the value of that course. I find in case after case that these men have not really had a philosophical course at all; they have merely done certain texts. It is the texts that matter. You may know Plato from end to end in English—that matters nothing unless you have done the Greek text of the "Republic." You may be ignorant of all the rest of Plato's writings; you may know only this one early experiment of that great experimentalist in political and social ideas, you may have failed to grasp even the nature of the general problems that exercised him, you may be blankly ignorant of the modern forms in which these perennial problems have re-stated themselves—but you suffice for Greats. On the other hand, while the Oxford and Cambridge mandarins insist upon this monstrous sacrifice of Plato to the language in which Plato wrote, they ignore altogether the tremendous bearing of modern biology upon those problems of individuation, those questions between unity and diversity, between the one and the many, that are at the very roots of modern philosophical discussion.

You see now the real inwardness of the attack I am making upon the Greek shibboleth. It splits and divides our national consciousness by setting up a barrier that cuts science off from philosophy and history, and the standard philosophical training from current ideas. We cannot get along with our scientific men cut off from the general thought of the community, and the general ideas of the leaders of the community cut off by a devotion to the dead languages from the stimulus of living science. The Greek barrier is even more mischievous at the upper levels of the university

course than at the lower. It is far more important to free our philosophy and history schools from the Greek shibboleth so that philosophy and history can be brought into proper relations with science and scientific men than it is to free Responsions and the "Little-go" from a smattering of compulsory Greek. Until you do that your man of science will still be an unphilosophical specialist and get as little respect as he does to-day, and your literary and political men will be unscientific, unprogressive and unenterprising, full of conceit about their "broader outlook," and secretly scornful of science.

That is my diagnosis. There is the fundamental disease from which British organization—English more than British—is suffering. We have to get rid of this blackmail of the Greek language specialists upon our brains and time and educational resources. Until we free our schools from it, and our philosophical and historical schools from it, our British community, our English-speaking community, will remain intellectually divided and enfeebled; and year by year the British Science Guild will lift its voice and bewail neglect of science, neglect of research, contempt for knowledge, failure of research to secure the best men, and the lack of public interest in and respect for science.

Before I sit down let me add a footnote to all this. It is so very hard in this country to say the very simplest thing, without laying oneself open to the gravest misunderstandings. I have not said a word, in all that I have been saying, against the beauty, the wisdom, and the wonder of the Greek literature. I do not want to rob the Heaven-sent classical scholar of his Greek. I want only to rob him of his monopoly, of his power of imposing upon modern philosophy

and modern historical study an amount of Greek that is neither beautiful nor wise nor wonderful. I do not even want to force upon him the fate he thrusts so resolutely upon the scientific man, of specialization and isolation. What I do want is this. Here, on the one hand, if you will, let there be an educational course leading up to the fullest and completest knowledge of Greek and Latin literature and the most finished culture that was possible before the Christian Era. Here, on the other hand, let us have another course leading up to living scientific studies, a complete modern education. Let these be the two pillars to the common arch of the whole system, the link and unifying structure of our imperial community, which is surely philosophy and history in reference to our present situation and the destinies of mankind. Let the classical man irradiate that common central interest with the light of other days; let the scientific man bring to it his inexhaustible new suggestions. That, I submit, in broad outline, is the higher education we need; that is the way to national unity; that is the crown of any complete system of National Reconstruction.

CHAPTER VIII

SCIENCE AND EDUCATIONAL RECONSTRUCTION

BY F. W. SANDERSON, M.A.

Head-master of Oundle

In the reconstruction of Education which is now being attempted, the advocates of Science are claiming for science a more effective place in the schools than it holds to-day. But they are baffled in their advocacy by an uneasy feeling that science teaching has not hitherto shown itself alive. It is useless to cry for science until the science teaching stirs itself into life; better let things remain as they are than bring in a "dead" science.

The fact is, that although science has come into the schools, the scientific spirit, outlook, and methods have not touched the fringe of the school life. One serious cause of this is, that science-masters have too little opportunities of becoming head-masters of great schools and so exerting their influence to the fullest extent. This restricts the outlook, and most science-masters have in consequence too modest a belief in science. They are content to join the staff of a school as specialists to teach a mechanic art. But science is not mechanic; science is creative, vital, fundamental, self-sufficient in everything that touches the welfare of the people and the development of the race. It must not, and will not, come into a school to teach a mechanic art; it comes to transform men's

ideals, to change the values of the things of life, to influence the whole education of the school. A high claim is made, but no lower claim will bring science into schools. No weaker belief will make science a true effective force.

The teachers of science do not take up their full responsibility in schools: they are too readily overwhelmed by the traditional authority which their classical colleagues maintain. The classical master has always had the charge of a form of boys, and he has made his influence felt in every part of their school life. He teaches classics, but he teaches much more than classics; from him the boys get their inspiration and ideals. But in most schools the science-master does not exert his influence in this way. He is called in as a specialist, to do a special work, and he keeps to this. This is where science remains weak and ineffective. Boys want to feel that their work in school is important, and that the ideals created thereby go with them into their everyday life, and permeate all they do. The science-master must make bold his claim, and be true to his mission. He must lay his claim large and wide, for the claims of science are great. All the astonishing wealth of the science we have to-day shows the working in the life of man of a new force, urging men to high exploits, to fresh faculties, to a change of aims, and to a reversal of belief. If any part of this life of science is to come to schools it must come with its full creative power in a large way. The science-master must be true to his mission. He must hold himself bound to be the messenger of a new ideal of life, and he may expect difficulties and opposition.

The entry of science into schools is not the simple thing it may appear; its coming means change which

is not simple but anarchic. And for this it comes slowly, with halting pace, for it calls for more than a place in the school. It calls for something more than a place in the curriculum, the admission to some examination, the organizing of an engineering side, or the building of new laboratories and workshops. These must be, but they are the dry bones of the thing. The most exclusive of conservative schoolmasters do not fear them. What men fear is a change of values.

But science is ever invoking a change of values. Its spirit is the spirit of growth, of change, of death and life. Its motto is always the words of the Master: "I came that ye might have life, and that ye might have it more abundantly." This is the direct teaching of the new science of Biology: it must be the watchword of all teachers of science. It is an answer to the question: What is life for? Science means changing, moving onwards, creating. Its outlook is onward. And so we get a guiding principle of science teaching. Science in schools must lead to research, discovery, and to the application of knowledge for the needs of man—not dwelling entirely on the past, but absorbing the past in the present, and moving onward.

The teacher of science must start with the things known, and go onward with the work which is waiting to be done. And there is a bountiful field of work to be done in which schools may take their share. This creativeness is the genius of science, its gift to men. The student of science must be ever doing, making, searching, creating. Science has little to do with dominance, or with the evolution of a dominant type. Here is where a differentiation sets in, for the public schools claim to educate for leadership—leaders

of men. What they teach and how it is taught springs out of this ideal. It is the ideal of the class-room. But the direct object of science-teaching is to send out a stream of inspired workers, inquirers, searchers, and the characteristics of dominance are not its concern. Whatever of dominance it may give is the dominance of service. Whether we like it or not these considerations are the root of the matter. To have life in itself science must be true to its own genius.

The science-master must also be true to this spirit. He must not be misled by the many fetishes with which it is sought to adorn educational theories. Such fetishes are often the prelude to deathly reaction. They appear in many guises—character, culture, "educating to think." All these may lead the schoolmaster away from his one purpose. The main purpose of education, as we conceive it, is none of these things; its purpose is to get more of life, of creativeness. If this be sought all things else will be added unto it. And this spirit of science the science-master will bring into all parts of the school life. Literature, Art, History, will be regenerated by this spirit. They form a wide field open for the teacher of science and his pupil to explore. Here he must claim his own—and be true to the genius of science.

It is to be feared that this high function of science is not maintained by the present race of science-masters. They keep close to their special work, with an intensive devotion which is a source of life to the school as yet not drawn upon; but they must aspire to a wider influence. Here are the words of a science-master of a celebrated public school. He says: "The best work in a school laboratory is always done by boys who have reached a reasonable standard in other subjects.

What is wanted is a sound general education, and less science." The statement itself has an air of indefiniteness about it, but we need not discuss it. It is an old question which might be buried. We read about it voluminously in the old days of the "Little-Go Greek" controversy. The important question for us to ask is, what is meant by science, for what the science-master, above quoted, means by science is not the science we are advocating for admission to the schools. It is probably a training in manipulative skill in the laboratory by the repetition of the well-known "elements" of science, and by carefully and logically organized courses of physical measurements. What he has in mind is a "dead" science—for science grows old and gives up its life to be born again. Many of the most vital of scientific discoveries have delivered their souls to others. The "science-master" had in mind the meticulous performance of "elementary" experiments, dearly venerated in the schools.

Science teaching too often begins (where we hope the teaching of languages has made a finish) in a drilling by means of the elements, the grammar of science. What the "science-master" whom we have cited has not in mind is what with repeated emphasis we call the "creative life of science." We claim that living creative science has more to give to literature, art, and history in these days than science has to gain from literary studies. The work of the schools is to study history, economics, philosophy, art, literature, under the dominant power of the new values created by scientific research and discovery. Here is work and faith for the teacher of science. He has to inspire the onward march of science, the reversal, change, growth of science. He can bring

new ideals and aims, and new methods into education. His methods are not limited to natural science. He can bring these into other workshops and laboratories, he can bring them into the literary workshops, the library, art room, museum, theatre. He can apply them to the social and economic questions, and let the school take its part in "escape." In times to come the schoolmaster will not be a teacher only, he will be a worker in some kind of knowledge, and will lead his boys with him. The schoolmaster's profession will find its own escape, and will not risk itself into the blind alley.

Again we say that science teaching must be alive, changing, moving forward. It should not have about it the atmosphere of certainty and finality. This kind of atmosphere is formed, however, by the traditional adherence to experiments on the verification of laws, and the study of the elements. The Laws of Science, Boyle's Law, Archimedes' Law, Faraday's Laws, Ohm's Law, Newton's Laws of Motion, the parallelogram and triangle of forces, the mention of which opens out a long vista of traditional experiments of our youth (all, it may be noted, quite detached from any knowledge of the great discoverers themselves)—all these should be dropped. Far better make full use of them in Applied Science. It is a safe rule at present to avoid making apparatus for teaching purposes. There is a plentiful supply of things in the world wherewith to sharpen the faculties. The special teaching apparatus has always seemed to me to be the unnatural part of the Froebel and Montessori systems.

How well I remember years ago setting out to teach science with an army of cylinders, brass, iron and deceptive wood, forty boys working in pairs,

all doing the same experiment at the same time, squared paper at sixpence per sheet, metric scales to order! Then the instrument makers came and fought with each other in turning out the cheapest "Archimedes set," or in inventing the most expensively elaborate set for rich people; then the schoolmaster came and improved on these, and invented new kinds of Boyle's Law apparatus and patented them, or sent them to the "School World." Perhaps these things were right thirty years ago. In those days boys never used instruments, or measured anything; they learnt elementary arithmetic (there was a great reform when the examiners set questions involving the metric units!), algebra, geometry, and when they got into the top set a little trigonometry and mechanics. In those days the dynamo was struggling with the engine to steady electric light. It is true that cotton- and silk-covered wire could be bought, but, if I remember right, the ammeter and voltmeter had not come, nor the storage battery, and the potentiometer was in the background waiting until more favoured instruments were tried. The march of science has spread itself out since then —so must the teaching of science. The potentiometer won in the long run, and the familiar cylinders, Boyle's Law apparatus, and all their kind must pass away.

I regret that I cannot even agree with those progressive schoolmasters who are content to break the fall by changing from the small cylinders and cheap balances to a barge in a bath. Much better make the plunge and try no more to "verify" or "discover" (faint deception) these well-known facts. Rather, read Archimedes. Read the researches of the Heroes of Science. Read Faraday's papers. Take his papers on Electrolysis, and mark the long procession of experiments, the number

and wonder of the stuffs, the diversity of method, the trials and failures, uncertainties, doubts and suggestiveness, the atmosphere of discovery. Read his electromagnetic researches, and watch the belief, the patience, openness of mind, inventiveness. Read the record of this long journey.[1] "Wound many coils of copper round, one half being separated by twine and calico." "Took a yard of copper wire, and wound silk round it, and then wound a second layer of silk." Read his diary. "Have got enough for to-day." "An excellent day's work." "September 23, 1831. I think I have got hold of a good thing." Third day, "No result." October 1, "Slight effect." Fifth day, October 17, "Think the cause is seen." Sixth, seventh, and eighth days, no record. October 28, ninth day, "A copper ring turns." Tenth day, November 4, 1831 (the year before the Reform Bill, but Faraday is not mentioned in serious history, save in a footnote), "Electric Induction is beyond dispute." A new creation story! Many will believe that the story of these researches is the invention of a literary artist.

I appeal, therefore, for an escape from the bondage of elementary science and physical measurements; those records have done their work for the present, and a wider sphere awaits us. There must be a return to the Romance of Science; a vigorous effort should be made to work at Applied Science in all parts of the school from the preparatory school upwards; and every school should have a well-equipped workshop.

I have shown elsewhere [2] how the Romance of Science can be kept before boys by means of experiments and exhibits which the boys themselves arrange.

[1] See Sylvanus Thompson's Life of Faraday.

[2] *Preparatory Schools Review*, March, 1916; also *see* Appendix

Mechanics, Physics, Chemistry, Biology, provide a host of such exhibits and experiments. Junior boys may set up a series of historic experiments; senior boys may illustrate modern advances. There are many books amongst the classics in science which will form a nucleus for such an exhibition. A few very well-known ones need only be mentioned. Tyndall's Heat and Sound; Faraday's Researches; Ball's Mechanics; Perry's Steam Engine; Thompson's Light Visible and Invisible; Wright's Projection of Light; Boys' Soap Bubbles and Perry's Spinning Tops; Lodge's Pioneers of Science. There are experiments on discharges through rarefied gases, radium and X-rays, vibrating springs, liquid air, rotating bodies. Many chemical experiments and biological exhibits are possible. Lectures or exhibits can be prepared to illustrate the life and works of the great investigators—men like Faraday, Dalton, Darwin, Pasteur. Original papers can in this way be brought before the school. If the school possess plenty of space many exhibits can be left on view for a term or more.

A valuable addition to a school, or combination of schools, is a Museum of History, where the development in Art and Science may be illustrated. In the Museum there should be a gallery of the world's workers and pioneers, that something may be learnt of their lives, and what they looked like. Here may be shown such things as the genealogical tree of the aeroplane, the uprising of Biology, the rescue of slaves, the influence of science in the social life, and so on.

Applied Science will demand a large instalment of plant, and spacious places. The class-room will be used chiefly as a tool-sharpening room—necessary but subsidiary. Schools will want spacious workshops,

engine-room and power-station; laboratories; engineering laboratory; physical, chemical and biological laboratories; museum; gardens; fields. This seems a heavy demand, but most of the public schools have already many of these, and the others with the requisite plant can be added. The Secondary Schools must expand in the same way. Nothing appears so prison-like and stagnant as the usual stack of class-rooms. What is wanted for the larger work are workshops, and workshops moreover of a new kind —literary, technical, and scientific workshops, with fewer class-rooms.

The teaching of Applied Science will be found to simplify many of the science problems. The science elements are included in such work, and abundance of practice is given in exact measurements. The study of the steam engine and of internal combustion engines is a good example. An experimental study of these in the laboratory and drawing office, inspired by such a living book as Perry's Steam Engine, is educational, informative, and suggestive of possibilities yet to reach. So through the range of Applied Mechanics and Physics—and in the wide fields of Chemistry and Biology—there is inspiriting scope.

Applied Biology and Applied Chemistry are full of problems awaiting the worker—well within the power of a school.

Biology, the most recent comer, should be an integral part of school studies, and take its place by the side of Languages and Mathematics. In the early years it should be taught to all, and later a group of earnest specialists will arise. The importance of Biology in a scheme of general education cannot be overstated. It can safely be affirmed that no study of social life can

be undertaken without a working knowledge of the results and methods of this science of life. The reading of history, of literature, and what are misleadingly called "humanistic" studies must be done again under the awakening influence of Biology. A spacious laboratory, gardens, fields, experimental farm, museum, will, in years near at hand, be an essential part of every good school. A miniature Kew, Natural History Museum, Zoological Gardens, Rothamsted Bio-Chemical Laboratory, might all quite well be placed within reach of the school-boy—for research, for history, for work, for delight and inspiration.

Romance of Science, Applied Science, and what is called in pedagogic professional language "Manual Instruction," but what I will call simply "Workshops," are the three aspects of the scientific work in school which open out fields of knowledge. The bureaucratic "Manual Instruction" brings to my recollection the kind of thing which used to masquerade in the schools. As I remember these courses of Instruction they were elaborately arranged exercises following in some "logical" order, in which the youth found himself learning to use a saw, a tenon saw, a rip saw, a jack plane, a smoothing plane, a gouge—and all for no purpose. Drawings he had to make, showing full dimensions of length and breadth and thickness—in hosts of cases where these were entirely unnecessary; but this work I suppose could be "co-ordinated" (blessed word!) with the rest of his work in school. The manual instructor—what kind of man was he? He was not a skilled mechanic, who could do the job and had at his fingers' tips all sorts of ingenious devices unknown to the mathematician. Such a man could not "earn grant." No! he was an elementary

schoolmaster, who had taken one sessional course at an evening school—he was at least qualified to earn grant. But these things may all have changed now, and I may be beating the air. Judging, however, by the position "manual instruction" is still condemned to take in the schools, I have a suspicion that this kind of thing dies hard.

This is the line of thought which prevails in the bureaucratic government: Manual instruction does not produce much inspiration—put it amongst the extras; Mechanics, as usually done, is largely mathematical—abandon it and let it take its old place in mathematics.

Does not the fact that Applied Mechanics has come upon us in the last fifty years, and touches all parts of the nation's life, seem to suggest that Mechanics should be reformed and given a higher place than ever, and that live workshops should replace "Manual Instruction"? Whenever the working classes themselves have had snatches of opportunities to arrange for their own education, they have gone off to Applied Science and the workshops. And they are right. Is the cry of organized labour of no account?

It is, we hold, seriously necessary that effective workshops should be established—not for public schools only, but for secondary and elementary schools. They must be on a large manufacturing commercial scale—comprising engine-room, enginering shops fitted with a complement of machine tools to work a large number of boys, carpenter's or pattern-making shop, forge and foundry. These shops can be made self-supporting. Good craftsmen would be turned out as leaders or workers in the industrial life of the country. A craftsman's knowledge is of value to all sorts of

professional men, and its importance will grow. And training in schools has many advantages over training in the works—where matters are distorted by the inevitable conflict between capital and labour. The anxiety of the employer to train his apprentices has come too late.

The school workshop is the home of "creativeness." Here the boys do not come to learn anything. Here there is no instructor, but fellow workmen. The boys come not to learn but to do, to make; and their attention is fixed on the work. This spirit, the determination to do the work, and to acquire skill to do more, will go with them into other parts of the school. So we believe. Such a workshop, arranged for output, with automatic, semi-automatic, non-automatic machines, plenty of repetition work, will give the means for studying the difficulties and dangers of modern industrial life. Boys will go out with a knowledge of this, and changes —highly necessary changes—will follow in the works: changes of work; higher work; use made of ability; development of the capacities of the workers; transference to office, and so "leisure" as it is called.

We contend that Education in Science on these principles should take a prominent part in the schools, and that what is called "general education" will take care of itself. I am not quite certain what is meant by "a general education," nor am I at all anxious that science or any subject should be made compulsory even for a leaving certificate at the age of 17. But as various syllabuses of the kind are now being formed it is well that the believers in a scientific education should realize that none of these examinations insist upon science. The idea of a general education sprang into existence when science became turbulent. The

educational policy of the head-masters says "more stress ought to be laid upon general education as a preliminary to a technical training." This I believe is the wrong way about. But even so the general education does not necessarily include science—but it does of necessity include a language, and English subjects. This is worthy of consideration in view of the concordats which are being reached. The first examination of the kind has just taken place for the School Certificate of the Oxford and Cambridge Board. This examination was taken by a large number of the leading public schools. There were 825 candidates, but not more than 50 or 60 were examined in science! Yet the certificate is a certificate for the much-discussed "general education." The executive have made science and mathematics alternative, and 772 took elementary mathematics, 194 advanced mathematics.

To make mathematics and science alternative will encourage neither the schools nor the education committees to undertake seriously the proper teaching of science. Science properly done demands an expenditure in capital, and maintenance, which as things are at present is outside the field of view of either the schools or the committees—not that money cannot be got, but the will is weak. Elements of science which are now being taught are quite ineffective, so that we can well imagine how a head-master who means business will set to work to make mathematics his chief concern. This is disastrous to education, but without heavy grants it is the best that can be done. The truth is, that mathematics, without its applications in science, is not a "creative" stimulus for the school—except, it may be, for a very few specialists. The woeful neglect of science by the

authorities concerned is the saddest state of things for the creative life of the nation. But it would appear that with all the concordats this neglect is to continue.

I have been asked by the editor to write on the Good and Bad Methods in Science Teaching. I have some qualifications to speak on the latter. In the course of time I have escaped from a method which I now hold is altogether bad, and I have all the conviction of a convert. I hope the escape is complete, but it is hard to be certain because the counter-attractions are alluring. However, I have little to say for—and much to say against—the slavish adherence to logic and logical form. I know quite well its attractions, and for a small number of special boys it may be the very life, but for the rest of the school I feel sure it is dull and of much less value than its advocates think. I need not dwell on the snares of formal logic, its insecure premises, or the doubtful uses to which it can be put. I believe we want to get away from formal "training to think." Boys come to school to do something, and not to learn. Learning will come as a by-product. A gorgeous illustration of the logical "order" system—the "teaching to think"—is seen in the joint report of a Committee of the Mathematical Association and the Public Schools Science Masters' Association. It is dated 1908, but I see it is confirmed in the Report of the British Association on Science Teaching just issued, and it has recently been re-issued. The Committee's Report is a working concordat solemnly made between the Mathematical Masters and the Science Masters of the Public Schools. They agreed that mathematics and simple practical measurements should be carefully didvied between the respective staffs. After evidence

had been obtained from the schools, it was agreed between them that any practical measurement requiring a balance, but not water, should be done by the mathematical master in his own class-room, but if water were required the measurements should then pass on to the science-master! I think this was finally agreed upon, but I am not quite certain. It is a quarrel between Euclid and Archimedes. Euclid, as far as I know, did not use water for any proof: Archimedes, of course, did. The Report should be read; it is a lengthy and complete report. I hope I am not doing it an injustice. I can understand the frame of mind, but I cannot now have any sympathy with it. There is some doubt in the Report as to what is the stage at which a boy should use logarithms, but the reporters are unanimously against the tables of anti-logarithms or co-logarithms. The slide rule can be given to boys after they have learnt logarithms. There is no doubt when the value of π should be experimentally determined, and no less than six methods, of which the boys should do at least two, are given in a special appendix. But I will say no more. I cannot see the point of all this, but I think it reveals a curious difficulty which masters have to meet when they set forth to get a live thing like science into the schools. The science-masters do the best they can.

Mathematics very slowly escapes from this meticulous bondage. I read that "mathematics is built up of a series of logical steps, each step in itself being simple and independent of authority. This study accordingly enables the teacher to call upon the pupil for a series of efforts adapted to his ability; in each case there is a reasonable prospect that a pupil will be rewarded with success; his success or failure can be made plain

to him as a matter beyond dispute, and independent of the authority and taste of any second person. The features which are peculiar to mathematics are the essence of its function as mental gymnastics." I am sorry I cannot live on this plane in schools—perhaps if I were teaching the very highest mathematics in the school I might, but for the average boy of the school it is too difficult. It seems to limit the range of mathematics, and restrict its application. I do not imagine the distinguished schoolmasters follow this too severely. They let themselves go, and the boys get to know more about things, and more of mathematics than they should, and before it is intended. For the sake of weaker brethren I should like to see any syllabus based on these principles undergo a drastic extension. So it seems desirable to me. My own plan is, to have mathematics taught from the beginning on the parallel system, and to a large extent by means of its application. Applied Science comes to the mathematician's aid. Very young boys of the preparatory school age can make the investigations. They can perform tests with steam and gas engines, finding horse power, efficiency, consumption of fuel, BHP, IHP, work out cards; experiment with voltmeters and ammeters; use a testing machine. Calculations required in experiments of this kind can be extended into the mathematical class-rooms. Tools, too, may be sharpened up here. Data can be supplied to be worked out in the class-rooms. The master can talk round the problem, and if many calculations are required the work can be divided up amongst the boys. The final results can be set forth, not as an answer, but in the form of a written report.

This form of teaching extends the range of mathe-

matics which may be covered in the early years, and boys of 14 or 15 may be introduced to the study of the Calculus and Co-ordinate Geometry. A good example is seen in the work done by young boys in Osborne and Dartmouth, where the range of mathematics is much extended. This, no doubt, was originally done for professional purposes, but is now found best educationally.

The research method may be pursued in History, English, Geography, Languages. Experiments on this method are being made in several schools. I should like to see what may be called literary workshops of spacious size, and fewer class-rooms. A school could be built on the plan of a museum, with working-rooms for the assistants: a spacious library, with books, maps, charts, diagrams; art-room with pictures, photographs, maps, charts; a large wing for French; another for other languages. Here several forms would be found working in a general mix up in all parts of the building—masters researching, boys helping. Take a public school form of twenty-five boys: five groups of five, voluntarily formed. One group is investigating the liberation of slaves: Travels in Africa; Crossing the Atlantic, Life in Kentucky, Virginia, Abraham Lincoln, Wilberforce, Bright. Another group: "The coming of the loom" and of industrial life in England; another the liberation of Italy; another Wars. A great and happy time is the result, and the boundary between school and play more hazy than usual. Yet this is a scheme not altogether Utopian.

One method of bringing boys into the atmosphere of the Romance of Experiment and Discovery is to

set the school free to prepare demonstration experiments and arrange for exhibits, and to hold conversaziones for discussion and inspiration. Such conversaziones can be organized by the senior boys on somewhat ambitious lines, and on a lower scale exhibitions can be given by the boys of the middle and lower school.

At Oundle we hold a Senior Conversazione in June, and a Junior Conversazione in the spring or winter term. Pamphlets are printed each year to serve as guide-books to these exhibitions. For juniors the notes are of some length, for the seniors the notes give only brief descriptions and are not intended to be complete. Further details are written up by the boys and form part of the exhibition, and eventually find their way into many a boy's notebook. The boys in charge of the experiments or exhibits have to be ready to explain their work, and answer questions, when beset by the numerous visitors. Fortunately this comes spontaneously—for better or worse.

A copy of the guide printed for the exhibition in June 1917 is given below. It follows the order of the rooms, is not necessarily grouped in subjects, and is here printed in a more compact form and type than in the original.[1]

The preparation is done by the boys partly in school-time, and partly in what is called out-of-school.

Some of the work exhibited is the result of investigations carried on by boys during the year; other experiments and exhibits are specially prepared. One great value of the Conversazione is that it gives an effective method of reviewing work done during the year by individual boys or groups of boys, and this method has many advantages not possessed by the system of marking or taking places in form.

[1] The extensive and varied catalogue of Exhibits given at this School Conversazione—is here reproduced in full, rough and informal as it is, in order to show the range and detail of experimental science with which it has been found possible to familiarize boys at a school where Science is made a leading (but not exclusive) feature of education.—EDITOR.

The boys arrange themselves into groups, and co-opt helpers from other parts of the school, classical or modern. Each group chooses what it will do, and every one finds that there is a plentiful supply of work of a varied character to be done in getting ready the experiments, or in collecting and arranging exhibits; in hunting up the authorities; in writing up and printing the descriptive letterpress; in drawing graphs, charts, maps, illustrations. They have also to be ready to explain their work, and to discuss it.

The exhibition is left in working order afterwards for as long a time as possible, and it forms the basis of some of the regular science study. A scientific atmosphere is created, and boys seem to get a good knowledge of the whole field covered by the exhibits. It is found, too, that boys learn one from another, more than might be expected, of the work done by their fellows in other groups.

Each division is under the charge of a master, and the method presupposes that there is a good staff of science masters, for the success depends upon the ability, enthusiasm, labour, and outlook of these masters. Without their zeal and inspiration no good would be done. With this inspiration and outlook it may truly be said that the borderland between in-school and out-of-school is in a wide and hazy mist.

OUNDLE SCHOOL

CATALOGUE AND GUIDE TO THE

EXPERIMENTS AND EXHIBITS

SHOWN IN JUNE 1917

I.—Exhibits and Experiments in Physics

Induction Coil.—This is a machine for multiplying potential (or voltage) in much the same way that a transformer at an electric-light station is employed for

lowering voltage: There is a primary circuit of moderate potential, which is alternately broken and remade rapidly by a spring or otherwise. This primary circuit is wrapped round an iron core to produce as great as rate of change of induction as possible. A secondary circuit is now wrapped round the first. If there are 1000 turns of the secondary to 1 of the primary, the rate of change of induction in the secondary (or the E.M.F. of the secondary) is 1000 times that in the primary.

For specially high potentials an *electrolytic break* is employed, since it causes much more rapid alternations than the spring commutator. In this break the interruptions are effected by the liberation of gas at the electrodes.

Tesla Coil.—The Tesla apparatus connected to an induction coil still further multiplies the potential, but above the frequency of the alternations. Very rapidly alternating currents pass over the surface of a conductor and not into the core. Thus several million volts may be passed through, or rather over, the human body without a shock being felt. The apparatus exhibited is devised for medical use. It will light vacuum tubes at a distance of several feet through air; the tubes may be held in the hand. An ordinary incandescent filament may also be lighted provided the filament be straight; if it is coiled the current is damped by self-induction, which at high frequency is far more effective than resistance.

The period of the Tesla is that of the discharge of two parallel plate condensers in oil; these are charged by an induction coil and discharged through two polished zinc balls (enclosed in a cylinder of blue glass) which give a very abrupt spark. The primary and secondary circuits form part of the same cylindrical coil. The dividing point is so arranged that these are " in tune " or resonating. Thus a high-frequency discharge is induced, which is found to have therapeutic powers.

Geisler Tubes.—A high-potential discharge is passed through tubes of various shapes containing rarefied gases. Apparatus to show the action of magnetic force on cathode rays.

Paddle-wheel Tube.—A strong magnet placed over the tube deflects the cone of light from the cathode. This demonstrates that the "rays" carry a charge. The direction of the deflection shows that this charge is negative. The deflected rays now strike the vanes of the paddle-wheel, causing it to spin round. This demonstrates that the rays carry momentum (*i. e.* that they have mass and velocity).

Shadow-tube with Cross.—When a cross is placed in the path of the rays, a sharp shadow is projected on the phosphorescent end of the bulb, appearing black on a green ground. After a while the cross is knocked over, and there immediately appears on the glass a bright green cross on the darker ground. This shows that the glass becomes "tired" under continued phosphorescence.

Phosphorescence in Various Substances placed in the Path of the Cathode Particles.—(Flower tube: willemite tube, etc.)

Screens which phosphoresce when placed in the path of the Röntgen rays.

Deep Shadows thrown by heavy substances when so placed, such as coins, keys, rings, bones, etc.; light shadows thrown by lighter substances, such as clothes, paper, leather, or flesh.

Projection Polariscope.—Light reflected from the surface of a mirror at a certain angle is polarized; *i. e.* it vibrates in a fixed plane.

The polariscope limelight is polarized in this manner and passed through a slide consisting of a variable thickness of some doubly refracting crystal, such as quartz. The incident light is split up into two perpendicularly polarized components passing through the crystal with different velocities. The relative retardation due to difference of velocity introduces a phase

difference between the emergent components, the resultant of which is light polarized in a plane inclined to the plane of polarization of the incident light. This rotation of the plane of polarization will be different for the different colours which compose white light: thus we have different colours polarized in different directions superposed at the same point of the screen, producing white light. If, however, we introduce an analysing nicol in front of the slide, there will be in each position some specific colour cut off by the analyser: the image is coloured, the nature of the colour depending on the position of the analyser and the thickness of the plate.

The action of polarizer and analyser is illustrated by a mechanical model, the waves of light being represented by waves along a string.

Accurate Spectroscopy.—Two spectroscopes by Hilger of the most modern type are now possessed by the School.

Quartz Spectrograph.—This has a specially cut quartz prism and very delicate adjustments. The spectrum is thrown on the plate of a specially designed camera attachment, and stretches right into the ultra-violet. Its presence can be shown by a uranium glass screen.

Constant Deviation Wave-length Spectrometer.—In the instrument the light suffers two refractions and one internal reflection. If incident at the proper angle, which is dependent on the wave-length, the light is deviated through exactly a right angle. Thus the telescope and collimator are set permanently at right angles. The position of the prism is determined by the wave-length of the light to be examined. The micrometer drum which rotates the prism table is graduated to read wave-lengths directly.

For photographic purposes a camera attachment is provided, while for work in the "infra-red" a line thermo-couple is used in conjunction with a sensitive galvanometer.

"*The Mirage.*"—When the air near the surface of the earth is warmed by the heated ground, its refractive

index is lowered below that of the air further from the surface. Thus the air acts as an inverted prism, and deviates light rays so that they become convex upwards. Thus rays from a source of light, instead of striking the ground, are bent up and reach the eye, while other rays starting from the same point may reach the eye by the usual path. The point thus appears double, and over a desert, the sky at the horizon and any lofty objects in the far distance may appear mirrored in the sand. The image is inverted. Since the only commonly occurring substance in nature, capable of acting as a mirror, is a smooth sheet of water, the observer naturally wrongly infers that there is a lake between him and the horizon.

The Rainbow Cup.—A soap film is stretched by the use of a celluloid wiper over the rim of a cup, which is made to revolve. Gradually a coloured ring pattern of alternate pink and green bands will be developed, each colour appearing at the centre and expanding gradually. The colours depend on the thickness of the film, which varies on account of the centrifugal force, also on the angle at which it is viewed. The thickness varies from 50 millionths of an inch to 1 two-millionth of an inch. If rotation is stopped, and the instrument left at rest for a few minutes, the colours will arrange themselves in horizontal bands. When these are established and the cup is turned, the bands are wound up into a spiral of intense brilliancy. When rotating at high speeds a black spot which gradually spreads outwards is formed at the centre: this is due to the fact that interference takes place between the light reflected at the top surface and that reflected at the bottom surface of film. A large flat film is stretched inside a frame. By means of a jet of air the film is thinned out in various places and the beautiful colours of thin films are produced.

Surface Tension Phenomena.—Experiments are performed to show the effects of the tension existing in any surface of separation of two fluids. For some of these

it is necessary to nullify the action of gravitational forces by the use of two liquids of nearly the same density which do not mix, such as, for example, ortho-toluidine and water.

Electromagnet.—A new electromagnet with adjustable pole-pieces gives a very strong field. A disc of silver aluminium is allowed to drop between the poles. As it cuts across the lines of force Foucault currents are induced. In accordance with Lenz's law, these currents tend to stop the motion which was originally responsible for them. Hence the disc falls quite slowly. A brass cylinder is rotated rapidly between the poles of the electromagnet. As before, the cutting of the lines of force induces Foucault currents, the energy of which is dissipated in the form of heat. The cylinder soon becomes quite warm.

Hibbert's Magnetic Standard.—A convenient apparatus for standardizing the Ballistic galvanometer. It consists of a permanent magnet surrounded by a thick iron shell. A brass cylinder fitting round the magnet and carrying a number of turns of fine wire is allowed to fall through a definite height. A constant quantity of electricity is caused to flow round the galvanometer circuit, and a " kick " of the galvanometer needle is thus produced.

Properties of Bodies in Rapid Rotation.—Bodies in rapid rotation assume properties very different from those they possess when at rest. Thus a rapidly spinning chain behaves as a rigid wheel.

Such a chain is thrown from a wheel turned by a motor.

A long endless chain in a vertical plane, if revolving fast enough over a gear wheel, will maintain an imposed distortion for a considerable time.

Try the following—

1. A disc of paper or thin cardboard revolving at high speed is able to cut through material of some thickness.

2 A wooden bowl is rotated and a little plasticine

put into it. The plasticine is spread out in a thin layer over the inner surface of the bowl.

Experiments are also shown to illustrate the gyrostatic effects due to rapid rotation. One gyroscope consists of a bicycle wheel with a heavily loaded rim By means of it precession and other phenomena are demonstrated.

3. Another small model illustrates the application of the gyroscope to the mono-railway.

Prof. E. Thompson's Repulsion Coil.—This is an induction coil devised for showing the mechanical effect of the primary on the secondary circuit. The apparatus is constructed for very rapid alternations. The primary circuit of about 20 ampères is interrupted by passage through an electrolytic break (see Induction Coil).

Repulsion.—A secondary circuit (an aluminium or copper ring in this case) enclosing the primary has induced in it a current of the same period as the inducing current, but of a different phase. If the self-induction of the secondary is small, this current round the coil is in the opposite direction : parallel circuits with opposite currents repel each other. A light aluminium ring placed in the middle of the bobbin will be violently hurried off owing to the repulsion between the inducing and induced currents.

A heavy copper ring, placed in the middle of the bobbin and hooked to the base by means of three strings will float near the top of the iron core when the current is switched on.

Lighting Effects.—When an incandescent lamp in series with a flat coil of wire is placed on the top of the iron core, the induced alternating current causes the lamp to light up. If a copper disc is placed on the top of the iron core beneath the lamp, the latter will not light up. The copper plate acts as a " shade," owing to the fact that the induced and inducing currents neutralize each other's variations, and combine to give a constant flux in the neighbourhood of the plate. As the produc-

tion of induced currents depends essentially on variation of flux no current is induced in the lamp circuit.

Rotation. — A small wooden cap with a vertical needle point is fitted over the top of the iron core and a copper disc is pivoted on the needle. The disc remains stationary, since the magnetic field is perfectly symmetrical, but as soon as a semi-circular copper plate is held immediately under the disc, the diameter of the semi-disc being approached as near as possible to the central pivot, the magnetic field at once becomes asymmetrical, owing to the shading action of the semi-disc. A rotating field is set up and the copper disc is set in motion.

Heating Effect.—The electrical energy of the currents induced in the rings is transformed into heat. If the copper ring is held at the centre of the bobbin, it will in a few seconds become quite hot.

The heating effect may be demonstrated by placing a hollow copper ring containing water and fixing it at the middle of the bobbin. If the open tube is closed with a small cork, the pressure generated will force the cork out, and a jet of steam will issue from the tube.

The Wimshurst Machine.—This is the most successful type of machine for generating electricity by electrostatic induction. When a charged body is brought near an insulated conductor, charges are induced on the latter conductor. These induced charges are equal in magnitude but opposite in sign. Thus if the inducing charge be positive it attracts a negative charge on the conductor and repels an equal positive charge. If the conductor be earthed this free positive charge escapes and we are left with our conductor negatively charged by induction. On removing the inducing charge we have the induced charge available for use, the energy being derived from the work done in separating the charges.

In the Wimshurst machine we have several pairs of glass plates rotating in opposite directions. These plates carry small conductors which alternately act

as inducers and as conductors on which charge is induced. The separation of the inducing and induced charge is of course a consequence of the rotation of the plates. We thus have a continual supply of charge of both signs. These charges are collected and stored in Leyden jars connected to the terminal spheres of machine until the potential difference of the terminals becomes large enough to give a spark.

Experiments are shown to illustrate some of the principles of electrostatics.

Vibration of Strings.—"The apparatus employed consists of a motor having fixed to the shaft a disc to which is fixed a pin carrying a rocking lever. This lever has a hook to which a string can be attached. The other end of the string is fixed to a slide by means of which a tension can be applied to the string. When the motor revolves it gives to one end of the string an irrotational motion in a circle and propagates waves along it. By adjusting the tension these waves can be made stationary."—(*Proc. Royal Soc.*)

The apparatus illustrates very clearly the phenomenon of refraction. When a light or sound wave passes from one medium to another its velocity is changed. This change of velocity is responsible for the alteration of direction, known as refraction, which consequently takes place. This change of velocity necessitates a change in wave-length. In the first place a single uniform string is used. By adjusting the tension we can arrange so that the waves travelling along are reflected, and by interference between the two we get stationary nodes (or points of no disturbance). The distance between consecutive nodes is half a wave-length. We now put a double string along the second half of length. Thus the waves are travelling in a different medium during the second half from that during the first. It will at once be seen that one half of the string contains more complete waves than the other—in other words the wave-lengths are different in the two media.

Two Springs of exactly the Same Period suspended from an Elastic Support.—If one spring is set in motion it transfers the whole of its kinetic energy to the second (and vice versa), for it jerks the second spring at exactly the right moments, and by the principle of conservation of energy, it must itself have lost that energy.

A Wilberforce Spring.—When a spring is stretched, the wire of the spring is twisted.

In this spring the twisting period of the wire is exactly equal to the " up-and-down " period of the spring.

Singing Flames.—A flame in a tube produces convection currents in the air. When the period of oscillation of the air in the tube (depending on the length and diameter of the tube) is equal to (or a simple multiple of) the period of flicker of the flame (depending on the length of the flame), sympathetic vibrations are set up and a musical note is heard whose loudness is dependent on the heat energy of the flame. Apparatus : flames in glass and iron tubes of various length producing different notes; flames in two tubes of equal length, so that one tube can start the other one singing. By revolving mirrors the flickering is shown to be rhythmic.

The Harmonograph.—A pen traces the movement compounded of the separate motions of two pendulums swinging independently.

Two forms of harmonograph are shown.

Duddell's Singing Arc.—This depends on the fact that the resistance of the carbon arc decreases with rise of temperature caused by increase of current. A variable condenser and an inductance are connected in parallel with the arc. The condenser-inductance circuit has a natural frequency depending on the product of the capacity and self-induction. This frequency is imposed on the arc, which is thrown into a condition of regular vibration and therefore gives out a musical note. Eight condensers are provided so that the frequency can be varied to that necessary for the notes of an octave.

Water Model of the Singing Arc.—"One of the essential properties of the electric arc is, that when the current through the arc increases, the potential difference between the terminals decreases. The model exhibited consists of a mushroom valve. The pressure tending to reseat the valve is so arranged that it diminishes very rapidly as the valve lifts. This is secured by suspending from the valve a small piece of soft iron which nearly touches the pole of a small electromagnet. If water be admitted below the valve the pressure rises until finally the valve lifts, *i. e.* the arc is struck, and oscillations are set up in the system. These oscillations correspond to those in the condenser circuit which are responsible for the singing of the actual arc."—(*Proc. Physical Soc.*)

Spectroscope: Experiments with Radiant Energy.—The source of radiant energy is an arc lamp. This illuminates a narrow slit. A thin beam of light passes through a prism, and is separated out into the familiar spectrum. We see the "colours of the rainbow," the red side being nearest the undeviated direction of the beam of light.

Experiments are shown to demonstrate that the spectrum contains more than is visible to the eye. A thermopile, in connexion with a sensitive galvanometer, shows that there are rays below the red, in the "dark" end, to which it responds. Certain screens (paper painted with sulphate of quinine in dilute acid, etc.) and solutions (of fluorescin, of horse-chestnut bark, etc.) respond to rays beyond the violet, again in the "dark." It can be shown that infra-red (heat) rays and ultra-violet (actinic or chemical) rays are reflected and refracted according to the same laws as rays of light. Experiments will be carried out to show this.

The colour of non-fluorescent substances depends on the light in which they are viewed; for example, a red poppy is red in the red part of the spectrum, but black in the violet.

Radium.—The radium atom breaks up, giving off

an inert gas known as the radium emanation; this again breaks up, passing through a series of consecutive stages. In the earlier transformations α particles (the α rays) are thrown off with considerable velocity, and in the later stages β and γ rays are produced.

The α rays are similar to the positive rays of a vacuum tube (or canal-strahlen), and ionize gases.

The β rays are cathode rays (*i. e.* they are electrons in motion), but their velocity is greater than that of the cathode particles; it may be as much as nine-tenths of the velocity of light.

The γ rays are regarded as being very active Röntgen rays: they are ethereal as opposed to the α and β, which are material.

The phosphorescence of screens and the penetration of the radium radiation through opaque substances is mainly due to these γ rays or pulses.

Experiments.—A charged electroscope is at once discharged when the radium is brought near the cap.

The phosphorescence of screens is shown.

Coins and pieces of metal in paper and between pieces of cardboard are seen (as shadows) on the screens.

Two scintilloscopes are shown, by means of which the presence of radioactive substances in minerals can be detected.

The Steam Engine.—This engine is of the double-acting slide-valve type, and is fitted with Meyer's Expansion Gear for giving variable cut-off. It has a bore of 5″ and a stroke of 12″; it is rated at 12 B.H.P. (brake horse-power). The engine was originally used for electric lighting, but is now employed only for experimental purposes. The boiler, which also supplies steam for the turbine, is of the locomotive type. and usually works at a pressure of 100 lb. per sq. inch, Readings taken, with the horse-power worked out, can be seen on a card near the engine; a curve connecting the brake horse-power and the indicated horse-power is also shown. The brake and the indicator for

determining the B.H.P. and I.H.P. respectively can be seen at work.

The Steam Turbine.—The turbine is of the De Laval type and is of about 7 H.P. (horse-power). The normal speed of the turbine wheel is 30,000 R.P.M. (revolutions per minute) : it is geared down in the ratio of ten to one for driving a compound-wound dynamo of maximum output 40 ampères at 110 volts. The dynamo is connected to a switchboard fitted with a number of lamps ; from the number of lamps in use the E.H.P. (electrical horse-power) can be calculated : a table of these readings is shown. The dynamo is also used for supplying the current for experiments in the laboratory requiring a larger amount of electricity than can conveniently be supplied from the storage cells. The rough principle of the turbine can be seen from a wooden sectional model shown on one of the side tables.

Buckton's Five-ton Testing Machine.—This is fitted with an autographic recording arrangement, which draws the extension-load curve when a bar is stretched to its breaking point. The machine can be arranged for tests in tension, compression, torsion, or bending.

Torsion Testing Machine.—To test the strength of materials under the action of a twisting force.

The Flashlight Optical Indicator.—In this instrument, the pressure in the engine cylinder acts on a spring-loaded diaphragm and deflects a small mirror. Thus the moving piston and pencil of the ordinary indicator is here replaced by the mirror and a beam of light which traces the indicator diaphragm on a screen. If horse-power calculations are required, the diaphragm is photographed. The chief advantages of the instrument are that inertia effects are minimized when testing high-speed engines, and that the diaphragms for succession cycles, being continually in view, show the behaviour of the engine.

The Hydrostatic Ball.—This experiment depends on the Bernouilli law that minimum pressure in fluids is consequent on maximum flow.

Alternating Magnet producing Accumulated Impulses. An electro-magnet energized by an alternating current exerts an attracting force at intervals corresponding to the natural time of vibration of a mass of soft iron on a thin bar. Hence violent vibrations are set up in the bar by the synchronized impulses (resonance).

Wheel illustrating Centrifugal Force.—A piece of plasticine thrown upon the inside of the curved rim of a rapidly revolving wheel will spread itself out into a thin layer due to the centrifugal force acting on it.

Spinning Egg.—A copper egg is placed in a basin over an annular iron coil which is wound in sectors with coils connected to the different phases of the alternating current dynamo. Since the currents in these coils alternate in succession, the resultant magnetic field revolves. Hence currents are induced in the copper egg which "motor" it round following the magnetic field, and so the egg spins on its end. A model of a squirrel-cage rotor is also made to revolve by the same coil, indicating the action of the ordinary induction motor.

Effect of Centrifugal Force on Belts.—At high speeds the belt tends to "hold away" from the pulley, and so the power that can be transmitted is reduced. The diagram drawn by the exhibitor shows that at belt speeds of above about 6000 feet per minute the power transmitted decreases.

Model of Air-lift Pump.—Compressed air is used to lift liquids, no valves or moving parts being necessary. The action is the reversal of the Sprengel's vacuum pump.

Model illustrating the Bernouilli Theorem applied to Venturi Meters.—If water flows in a horizontal pipe of varying section, its pressure plus the square of its velocity remains constant. Therefore, when flowing through a narrow neck the velocity increases, and so, contrary to general opinion, the pressure is reduced. The jet at the centre being under reduced pressure holds together and crosses the open space without loss.

If the pressure at two different sections is known, the quantity of water can be calculated from the ratio of the sections. Water-meters are made on this principle to register amounts up to as much as 14,000 gallons per hour.

II.—Exhibits and Experiments in Chemistry

Gas Analysis.—Hempel's Apparatus: The gas to be analysed is drawn into a burette and measured. It is then transferred to different absorption pipettes in turn, its volume being measured in the burette after each absorption. The diminution recorded is the volume of the constituent removed. The apparatus has recently been used for the analysis of the coal-gas supply, and the pipettes are filled with the following absorbents—

Alcohol for hydrocarbon vapours. Potash solution for carbon dioxide. Fuming sulphuric acid for heavy unsaturated hydrocarbons. Alkaline pyrogallol for oxygen. Ammoniacal cuprous chloride for carbon monoxide. The hydrogen is removed by palladium sponge. The methane is exploded with oxygen.

The Orsatt Apparatus: A more convenient form of apparatus for the analysis of furnace and flue gases has lately been added to the equipment of the laboratory. In this the four absorption pipettes and the measuring burette are combined in one piece, making it easily portable. This type is extensively used in technical commercial work.

Manufacture of Coal Gas and its By-products.—A model of a coal-gas plant, made by the boys in the school workshops, is shown, and coal gas will be manufactured by it. Arrangements for cooling and cleansing the gas, and for separating and collecting the by-products are shown. One ton of good gas coal will give 10,000 cub. ft. of gas, 115 lb. coal tar, 177 lb. ammoniacal liquor, 1568 lb. coke.

Manufacture of Liquid Air.—Air cooled by ice and

salt mixture passes down a long spiral surrounded by a vacuous jacketed Dewar flask. At the bottom of the spiral the air, which is at a pressure of 120 atmospheres, escapes through a small hole. The sudden expansion caused by the change from this high pressure to atmospheric pressure produces cooling of the gas. This gas rises and passes round the spiral, thus cooling the gas that is next to escape through the tiny valve. By a continuance of this "self-cooling" a temperature of −195° C. is reached, when liquid air commences to drop into the receiver. About 100 c.cs. can thus be obtained from 200 cub. ft. of compressed air in about ten minutes.

Pigments.—The preparation of the following will be shown: Chrome green, viridian, cobalt blue, Scheele's green, Prussian blue, Turnbull's blue, Freeman's white lead, zinc white, cadmium yellow, lemon yellow, chrome yellow, king's yellow, artificial madder lake, venetian red, carmine.

Recovery of Ammonia from Gas Liquor.—The gas liquor from the works is heated with lime, and the evolved ammonia is absorbed by sulphuric acid, forming ammonium sulphate. This gas liquor is our chief source of ammonia.

Distillation of Coal Tar.—Coal tar is rich in valuable oils and other bodies of great commercial importance. The coal tar is distilled, the distillate coming over at different temperatures being separately collected. These are again distilled, and still further separated, the chief final products being benzol, solvent naphtha, naphthalene, carbolic acid, anthracene, and pitch. From these are obtained many of our essences, perfumes, dye-stuffs. Some of these are shown in process of preparation. Specimens obtained during the year from coal tar are shown.

"Working up" the Coal-tar Products.—The preparation and purification of the following bodies from coal-tar products is shown: Anilin, nitrobenzene, fluorescin, phenolphthalin, malachite green.

Preparation of Other Organic Bodies.—Ether, chloroform.

Illustration of the Manufacture of Alcohol from Starch.—Starch paste is warmed with a trace of sulphuric acid. The latter catalytically promotes the combination of starch with water to produce sugar. In a second experiment sugar solution is being fermented by yeast. The plant secretes an "organized" catalytic agent called zymase, which promotes the decomposition of sugar into alcohol and carbonic anhydride (CO_2). It is the escape of the gas which gives the appearance of "boiling."

In the third experiment the dilute solution of alcohol is being distilled. For this purpose *Young's Dephlegmator* is being used. It shortens the time and diminishes the difficulty of separating the alcohol and water. It does the work of the large stills of distilleries and is more efficient.

Dr. Dennstedt's Apparatus for Analysis by Combustion.—By means of this modern apparatus an analysis which would take many hours by the older (Liebig's) method, can be performed much more accurately in less than an hour. In industrial laboratories it is superseding the old method. The principle is that the substance should be largely volatilized in oxygen and carried over platinized quartz or platinum contact stars, where the combustion proper takes place. The products of combustion are absorbed in the usual way.

The Etching of Glass.—Hydrogen fluoride (hydrofluoric acid gas, HF) reacts with silica (SiO_2) and silicates to form the gas silicon fluoride (SiF_4) and water, hence it etches glass. The silicon fluoride reacts with water to yield fluorsilicic acid (soluble) and silicic acid (insoluble). Since hydrofluoric acid does not attack paraffin wax, the surface to be etched is first covered with wax, the legend scratched through it, and this is exposed to the action of the acid. The demonstrators will etch visitors' signatures on slips of glass.

Glass Blowing and Bending: Silica Glass.—When heated, silica changes only very slightly in size, hence it will survive rapid changes of temperature. Silica tubes are here heated in the blowpipe flame, and while still red-hot are plunged into ice-cold water. The preparation of silica vessels demands great skill.

Preparation of Ozone.—Dry oxygen, when exposed to the influence of the "silent electric discharge," undergoes a profound change into another substance called ozone. This substance has a very characteristic and penetrating odour. It is tested for with starch iodide papers, which it turns blue. It is now used commercially for bleaching.

Mercuric Thiocyanate: "Pharaoh's Serpents."—Mercuric thiocyanate is precipitated by adding a solution of potassium thiocyanate to a solution of mercuric chloride. This is filtered off, washed, and dried. When ignited, the evolved gases cause the mass to swell out into an ash resembling somewhat the convolutions of a serpent.

Thermostat.—A lamp immersed in a liquid raises the temperature to the limit required. When this is reached the mercury in the thermometer closes an electric circuit which automatically through a relay cuts out the lamp. As the temperature falls the lamp is re-lit. This instrument is useful for work where it is necessary to keep a liquid at a constant temperature for a considerable time. A simple device for maintaining a constant level in the liquid is also shown.

The Manufacture of Explosives.—Trinitrotoluene—the new German explosive, now made extensively in England. Picric acid—2-4-6-trinitrophenol and its sodium salt—the essential constituents of lyddite and melinite. Both of these bodies are derivatives of coal tar.

Gunpowder. Nitroglycerin—the essential constituent of dynamite. Guncotton. Specimens of all these have been made in the laboratory and are shown.

Invisible Ink.—A solution of cobalt chloride is used.

This is pink, and the writing on pink paper is quite invisible. When this is heated the salt loses its water of hydration and changes into a deep blue body. Breathing on this once more renders the writing invisible.

Manufacture of Sulphuric Acid.—This is shown on a laboratory scale by two methods. In the contact process sulphur dioxide and oxygen are passed together over platinized asbestos, which acts as a catalyst. The sulphur trioxide produced is absorbed by dilute sulphuric acid, and this is diluted as the sulphur trioxide is absorbed. Thus a larger volume of dilute acid is obtained. In the chamber process the catalyst is nitric peroxide. A tower is fixed at the outlet of the chambers to absorb the nitric peroxide swept out by the current of gases. The nitrosulphonic acid formed here is allowed to trickle down a second tower at the entrance to the chambers. Here the incoming gases liberate nitric peroxide, which is swept forward to do service again in the chambers.

Electrolysis and Electroplating.—An electric current is passed through : (1) Water made conducting by a few drops of sulphuric acid. This produces hydrogen and oxygen. (2) Hydrochloric acid producing hydrogen and chlorine. (3) Solution of copper sulphate, the copper being deposited on the body acting as the kathode. (4) Solution of potassium argenticyanide, the silver being deposited on the kathode. (5) Solution of nickel sulphate, the nickel being deposited on the kathode.

Flame Tests and Borax Beads.—Certain metals can be recognized in their compounds by the colour of their incandescent vapour. Certain metallic oxides dissolved in fused borax form coloured borax glass. These analytical tests are demonstrated.

The Silica Garden.—Metallic silicates are produced by immersing crystals of various salts in a solution of sodium silicate. Films of metallic silicates are formed and by osmosis they swell and take the curious forms shown.

Cupellation of Silver.—Lead ores containing silver are first reduced, giving an alloy of the two metals. This is then roasted in air, the lead oxidizing to plumbic oxide. This has a lower surface tension than the molten silver and percolates through the crucible of bone ash, called a cupel, leaving the pure silver.

The Making of Alloys.—Copper and zinc are fused together to make brass. This requires a high temperature, and an injector furnace is used. The method of casting is shown.

Diffusion Apparatus.—Gases diffuse through a porous partition at rates inversely proportional to the square root of their density. On surrounding the plaster plug with a light gas, as hydrogen, the diffusion of the gas into the tube is more rapid than that of the air outwards. This causes an increase of pressure inside the tube, which forces the mercury to complete the circuit, and the bell rings.

Deposition of Silver on Glass.—An ammoniacal solution of silver oxide is carefully made. When this is reduced by a solution of lactose or glucose, silver is deposited as a pure film. It is by this method that the reflecting surfaces of optical instruments, such as reflecting telescopes, are prepared.

Use of Indicators.—The indicators commonly used in the laboratory are litmus, methyl orange, phenol phthalein, starch paste. Their use is demonstrated.

Determination of Molecular Weights.—Victor Meyer's Vapour Density Apparatus. Beckmann's Freezing Point Apparatus. Eijkmann's Depressimeter. Beckmann's Boiling Point Apparatus.

Potassium Burning on Water.—This metal attacks water with such vigour that the heat of chemical action causes the hydrogen produced to ignite, and this in turn ignites the potassium.

Experiments with Chlorine.—The preparation is shown. This gas is one of the chief poison gases employed by the German army. Its bleaching and other properties are demonstrated.

Experiments with Oxygen.—The preparation of this gas is shown. Bodies burn very vigorously in it. Iron wire is shown burning in oxygen.

Preparation of Nitric Acid.—This is made from sodium nitrate and sulphuric acid by distillation.

Manufacture of Soap.—Soap is made by boiling fats or oils for a long time with soda or potash solution. This hydrolyses the fat or oil and breaks it up into the sodium or potassium salt of the fatty acid and glycerine. On pouring the solution into brine the soap separates out, and is collected, washed, and squeezed dry.

III.—Exhibits and Experiments in Biology

The Experimental Gardens and Biological Laboratory are open to visitors during the day. Short notes only are given in the present guide, as full notes, illustrations, and specimens are attached to the exhibits.

Physiology and Pathology.—(1) Hæmo-cytometer. This apparatus is used for determining (*a*) the number of white corpuscles (leucocytes), (*b*) the number of red corpuscles, in the blood. Accurate determination of these numbers is demanded in modern medical work. (2) Determination of Sugar in Physiological Liquids. The apparatus, as set up, gives accurate readings in a few minutes. A knowledge of the sugar content of certain liquids is of considerable assistance in the diagnosis of diseases. (3) Urea Estimation.—This estimation is frequently required. The apparatus used is very suitable for rapid work. (4) Tests for Albumen, Phosphates, and other substances.—Testing for these substances is of importance. The tests are simple of demonstration. (5) Analysis of Food for Fat.—The Soxhlet method of determining the fat content depends upon the fact that fats are soluble in and can be extracted from food by ether. The analysis of human food, cattle food, and of other natural bodies containing fat is often of prime value in estimating the food value. (6) Estimation of Butter Fat in Milk.—Milk is

analysed by the Gerber method. The method is rapid, accurate, and the chemicals employed are cheap. The estimation is of the utmost importance. *Blood.*—Slides showing structure; blood circulation seen in the tadpole's tail; pigment cells of the frog. *Plant Nutrition.*—Experiments illustrating the needs of a plant for growth.

Aquaria.—There are six large aquaria, and a number of smaller ones which can be aërated by means of a motor. This aëration is essential for marine animals and for those freshwater animals that live in the well-oxygenated water of shallow, fast-flowing streams. Notes on the occupants of these aquaria are to be found upon the aquarium itself. *Large Aquaria,* containing larger forms of aquatic life, aërated by special aërating apparatus. *Small Aquaria* with small and microscopic forms of freshwater life. *Special Exhibition of Microscopic Pond Life.*

Vivaria.—Several vivaria contain lizards, snakes, frogs, toads, etc. There are many points of interest connected with the life-histories of these vertebrate creatures. As with the aquaria and insect cages, full notes are placed near the animals.

Insect Houses have been set up so that the life-histories and habits of insects may be studied. The following have been studied or are being kept under observation: yellow ants in their formicarium; tree wasp's nest with queen and developing pupae; click beetle and larvae; devil's coach-horse beetle; onion fly, larvae and pupae; several dipterous leaf-miners; oak-gall mites; scorpion flies; ladybirds and larvae; earwigs; cardinal beetle; soldier and sailor beetles; aphides; frog-hoppers and their larvae contained in "cuckoo-spit." The list of Arthropods kept varies from week to week.

Breeding-cages for Lepidoptera.—A number of Lepidoptera are kept in special breeding-cages and observations are made upon them during their metamorphoses. Genera belonging to other Insect Orders

are also kept in these cages, *e. g.* stick insects, gall wasps, etc. Brief notes made at the time of writing refer to the following but are not printed here.

The mullein shark; the early thorn; the small eggar; the emperor; the puss moth; the pebble prominent; the drinker; the lackey; the large emerald; the eyed hawk; the currant or magpie moth.

Protective Mimicry.—One factor which determines whether weaker animals shall survive in the keen competition between the various forms of animal life is the power of the weaker to escape detection by the stronger. Various forms of animal life have been arranged to illustrate this phenomenon of protective mimicry.

Protective mimicry among the Lepidoptera, showing instances of protective form and coloration.

Instances of variations in species of Lepidoptera.

Photographs of skeletons, of birds' nests, of young birds, and of various objects of interest in the animal world.

Japanese Waltzing Mice.—Explanation of the "waltzing" habit, and other notes.

Some Practical Applications

The Historical Development of Agricultural Draining. The following systems of draining are represented by models: (1) Essex system—trenches filled with faggots; (2) Deanstonizing—trenches filled with small stones; (3) Elkington's system of deep draining is shown in model; (4) Modern agricultural draining is demonstrated in simple fashion. The models are accompanied by drawings, notes, and specimen, explaining the development of draining and some of the leading features of modern draining.

Bread-making.—1. Experiments showing the meaning of "Strength" in wheat. 2. Further investigations, suggested by results from (1), to determine the best theoretical conditions for making a good loaf from wheat flour mixed with varying percentages of barley flour, and of maize flour. 3. Loaves made from mixtures

experimented with in (2). 4. Photographs of results already obtained.

Improvement of Fertility in Land.—1. Specimens of Leguminous Plants—the plants that add nitrogen to the soil. 2. Preparation of Slides showing Nodule Bacteria. 3. Illustrations and Specimens of Leguminous Plants. 4. Cultures of other Bacteria that add Nitrogen to the Soil. 5. Analysis of Soils.

Milk Analysis.—(1) Determination of percentage fat in milk.—Gerber centrifuge method. (2) The creamometer. (3) The lactometer. (4) Qualitative examination of milk for fat, sugar, casein.

Food Analysis.—(1) Determination of percentage fat in cattle cake—Soxhlet's method. (2) Determination of percentage of Protein in cattle and poultry food.

Poultry.—(1) Exhibitions of breeds—Black Minorcas, Rhode Island Reds. (2) Chickens showing good and bad colouring. (3) Poultry foods.

Various

Dissections of the frog and worm, with explanatory notes and diagrams.

Photographs of various dissections of the frog.

Development of two-headed frog tadpoles.

Photographs of British Trees.—Tree in winter, tree in summer, twig, flower, leaf, bole.

Microphotographs of sections of Plant and Animal Tissue.

Plant diseases of economic interest.

The Past, Present, and Future of Biology, illustrated by notes, photographs, specimens, and old books relating to the science of Biology.

The Origin and Antiquity of Man.—Early man in Northamptonshire. The story of the Creation illustrated by Palæontological and Palæobotanical specimens and pictures.

Natural Products of Economic Importance.—Timber, wools, furs, hair, etc.

CHAPTER IX

THE AIM OF EDUCATION

BY SIR RAY LANKESTER, K.C.B., F.R.S.[1]

At a Conference called by the "Committee on the Neglect of Science," and held in the rooms of the Linnean Society of London on May 23, 1916, under the presidency of the Right Hon. the Lord Rayleigh, O.M., Chancellor of the University of Cambridge and Past-President of the Royal Society of London, the following resolutions were passed unanimously—

(1) That in the opinion of this meeting it is a matter of urgency, in order to promote national efficiency in the near future, that the natural sciences should be made an integral part of the educational course in all the great schools of this country, and should form part of the entrance examination of the Universities of Oxford and Cambridge as well as of the newer universities.

(2) That it is in the highest degree desirable that the Government should exercise the large power which it possesses of encouraging the study of the natural sciences and thereby increasing the efficiency of our public servants; (i) by assigning capital importance to the natural sciences in the competitive examinations for the Home and Indian Civil Service; (ii) by requiring some knowledge of the natural sciences from all candidates for admission to Sandhurst.

[1] It should be understood that the views expressed in this chapter are those held by the writer, and that, with the exception of those embodied in the resolutions of May 3, 1916, they must not be attributed, as a matter of course, to the members of the Committee on the Neglect of Science and their supporters.—E. R. L.

The meeting was attended by about 200 representatives of universities, scientific societies, and others prominent in scientific research and the application of science to industry. The resolutions were moved and supported by men eminent in various fields of activity, among them the Master of University College, Oxford; the Vice-Chancellor of the University of Cambridge (Dr. Shipley); Prof. Sir Edward Schäfer of Edinburgh; the Poet Laureate (Dr. Bridges), Sir Harry Johnston, Lord Montagu of Beaulieu, the Right Hon. F. Huth Jackson, Mr. H. G. Wells, and Profs. Poulton and Turner of Oxford.

Letters of sympathy were read from the Duke of Bedford, the Lord Chief Justice, the Dean of Christ J. J. Thomson, O.M., and others.

The dates of the Foundation Meeting, erroneously given on page 250 as May 23rd, and on page 253 as May 6th, should be May 3rd.

, together with other ting, was printed as a it were distributed to members of the legislature and the learned professions, to the leading newspapers, the mayors of great towns, and, in fact, wherever it was likely to be useful. Copies of it may still be obtained from the publishers, Messrs. Harrison of St. Martin's Lane, or from the Secretary of the Committee on the Neglect of Science, Major Bryant, Wellington College, Berks.

In accordance with the decision of the Conference, the Committee brought the resolutions above cited to the notice of H.M. Government, and had an interview for that purpose with the Marquis of Crewe. They also were in communication with the Civil Service Commissioners, and when subsequently a special Committee was appointed by the Government to consider the question of reforms in the scheme of examinations or the Home Civil Service, these resolutions and the

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Letters of sympathy were read from the Duke of Bedford, the Lord Chief Justice, the Dean of Christ Church, Sir Guy Granet, Prof. J. J. Thomson, O.M., President of the Royal Society, and others.

The report of the speeches, together with other matter connected with the meeting, was printed as a pamphlet, and 10,000 copies of it were distributed to members of the legislature and the learned professions, to the leading newspapers, the mayors of great towns, and, in fact, wherever it was likely to be useful. Copies of it may still be obtained from the publishers, Messrs. Harrison of St. Martin's Lane, or from the Secretary of the Committee on the Neglect of Science, Major Bryant, Wellington College, Berks.

In accordance with the decision of the Conference, the Committee brought the resolutions above cited to the notice of H.M. Government, and had an interview for that purpose with the Marquis of Crewe. They also were in communication with the Civil Service Commissioners, and when subsequently a special Committee was appointed by the Government to consider the question of reforms in the scheme of examinations or the Home Civil Service, these resolutions and the

views of members of the Committee on the Neglect of Science were considered, and have been referred to in the Report of the Special Committee. Moreover, the Government appointed a second Committee, under the chairmanship of Sir J. J. Thomson, to report on Science and Education generally. The Committee on the Neglect of Science gave a large amount of evidence to Sir J. J. Thomson's Committee, but up to the present moment no report has been made by that body.

The Special Committee on the Civil Service scheme of examinations has issued a Report, which contains proposals for a new scheme as to subjects and marks assigned thereto in the competitive examinations held by the Civil Service Commissioners for appointments in the Home Civil Service. It is not my intention to discuss that Report here, but I may point out that although it is now proposed to make it possible for a candidate to obtain as many marks in natural science subjects alone as he can in other subjects similarly grouped, and though a formal equality and "fair-play" are thus given to natural science studies, yet the authors of the Report definitely refuse to recommend the requirement from candidates of any knowledge of natural science as a qualification for competition. They declare that so far as they are concerned they propose to give a fair and equal opportunity to those who offer natural science subjects, but to insist on this or that course of study is a step which they leave to the schools and universities. Hence the reporters definitely refuse to make that breach in the wall of classical monopoly of school education which the Committee on the Neglect of Science have urged as the only obvious path to a reform in education. Since this refusal of the Government Committee to insist upon some knowledge of

natural science in the Civil Service examinations, it has been suggested that the authorities who have the ultimate control in this matter should be asked to assign a definite number of appointments—say, one-half or one-third—to candidates who offer two or more branches of natural science and obtain the qualifying number of marks.

There can, I think, be no doubt that those who agree with the resolutions of the Conference of May 6, 1916, have to confront a solidly entrenched and determined foe—the present monopolists of public school education who depend for their livelihood and social position on the perpetuation of the ancient "classical system" of education, that is to say, on the assignment of three-fourths of the school-time of the well-to-do class to drilling in Latin and Greek grammar, in fragments of ancient history, and the translation and memorizing of scraps of Latin and Greek authors. The schoolmasters occupied in carrying on this system and the other authorities who govern the great schools of this country exclude other far more important subjects from a proper share in the school curriculum, and in the fees, endowments and rewards of which they have control. But as a matter of fact those directly responsible are only a part of the large body of the well-to-do class, who have themselves been brought up in schools where "the classical system" dominates, and consequently suffer from defective education. It is only natural that they should be unwilling and even unable to recognize their own deficiency, and that they should consider that "the gentleman's education" which was good enough for them is good enough for the youths of the next generation, whom they expect to take prominent positions in the government of the country, as county

magnates, as members of Parliament, or as officials of the Civil Service and responsible administrators of public affairs. To consent to a radical change in the curriculum of school and university would be to confess that they themselves have not received a liberal education. The difficulty thus presented is admirably sketched in Chapter IV of the present volume, written by the late Lord Houghton.

The history of the domination of "the classical system" in our schools and universities, now so disastrous, is given in the richly documented essay by the late Mr. Charles Stuart Parker (pp. 14 to 90 of this book). We who desire a great change in school teaching and the complete suppression, not of languages and literature as subjects of school education, but of the futile and injurious "classical system," can at the moment do no more than present, as we do in this volume, to those who are willing to consider the matter, the careful statements of writers of authority who have set forth the historical circumstances which have led to the present unfortunate state of the "higher" education in this country; of others (such as the late E. E. Bowen of Harrow), who point out its injurious character; and again of others who advocate, with conviction based on experience (as do the Master of Balliol and Mr. H. G. Wells), the urgent necessity for the introduction of another system of education, the main purpose of which shall be to give to the future citizens of our country (in addition to some literary culture) a knowledge of "that which is"—an understanding of the laws or rules of the universe in which we live, that possession which was called "wisdom" in old days and is now termed "science."

Those who concern themselves with the discussion of educational methods and systems do well to ask

themselves what after all is, or rather should be, the aim of education. From time to time attempts are made to give brief emphatic answers to this question. We are told by some that the aim of education should be to enable a youth to earn his living, by others that it should aim at fitting him to associate with gentlemen. Others say that its aim should be to form character. Some define its aim to be the making of worthy citizens and useful servants of the State, others that its purpose should be to ensure self-realization. Another writer urges that it should not be the aim of education to teach us how to earn a living, but how to enjoy life, and that this ought to be as open to the manual labourer as to the brain-worker. It must be admitted that the recognition of each of these aims has much to justify it, but that not one among them taken by itself can serve as a guide to us in determining what should be the subjects and the methods of education. Each points to this or that result as the one to be chiefly sought by means of "education," but necessarily such brief expressions do not indicate what is the actual educational procedure by which the desired result can be obtained.

It is, I think, obvious that "education" is so vast and varied a process that no brief summary of what should be the aim of any purposeful direction of its course is possible. The education of living things is always taking place by the incidence of the natural forces of the environment. What we are here concerned with is the *purposeful* education administered by the elder to younger generations of men as distinct from that "natural" or "non-human" education. And we are here more especially concerned with that purposeful or directed education given in schools and universities which follows upon an earlier, and in

many respects more important and deeply effective, education directed by the traditions and customs of the natural guardians of babyhood. The latter is a special subject demanding separate consideration which it has not sufficiently received and we cannot give to it here. The later education with which we are concerned has, however, the closest relation to the primary and basic education given in the nursery and family group. For unless the guardians of infant life are themselves educated so as to be trustworthy educators of the most sensitive and impressionable young growths of humanity, who shall direct those tender buds, train them aright and protect them from mental as well as physical distortion?

Systematic education, skilfully and rigorously applied to the youth of a nation, is a power of enormous possibilities. By it the mediæval Church tamed the rough people of Europe and reduced them to a peaceful condition of intellectual slavery. By it the modern German Empire has converted the once hostile population of German-speaking states into the willing tools of the Prussian military despotism. In this country the vast possibilities of education, whether for good or for evil, are and have been for centuries neglected by the State and left to haphazard and the tenacious survival of antiquated custom. The decay of education in this country due to the apathy of its rulers has led to the appropriation of the more important educational endowments by the richer class, and the complete neglect by all political parties of any care for or interest in that great instrument of national development. Only within the lifetime of many of us has a timid commencement been made in this country in the recognition of the duty of the State to provide funds for national education, and to take some pains

to secure efficient guidance and intelligent, disinterested determination of an educational scheme. As yet but little has been done in this matter; the public funds assigned are ridiculously insufficient, and the prevalent notions as to what should be the aims and scope of school education are crude and restricted by the traditions of inept authority. A harmful confusion of the activity of the State on the one hand as controller of religion, and on the other as provider and director of the intellectual education necessary for the health and prosperity of the community, has survived from the earlier conditions when the two were inseparable. The acceptance of the "voluntary principle" in religion has furnished politicians who have more belief in parsimony in public expenditure than in the national value of intellectual education, with an excuse—a false analogy—for leaving the latter also to the tender mercies of the voluntary principle. Hence "the right of private judgment" is set up as a reason for the abstention on the part of successive Governments from organizing the intellectual education of the country on reasonable lines. According to this doctrine the mental strength and resources of our people are to be left without direction or development. A nominal sum is spent on the teaching of rudiments to the poorest class, whilst the old public endowments of higher education are deliberately assigned to be dealt with capriciously and without any considered or approved purpose by irresponsible and uncontrolled corporations. Meanwhile the immense power of education in developing the character, capacities and prosperity of the nation—when wisely applied—is neglected, and for all that our statesmen care this gigantic source of strength and happiness might be non-existent.

In regard to the question as to what should be the

actual procedure in education—supposing one of its chief aims to be "to promote national efficiency by making the natural sciences an integral part of the educational course in all the great schools of this country"—I will venture to state my own opinion. I will enumerate what seem to me to be the main features which are necessary in school and university education at the present time, an education entered upon by a boy as early as eight or nine years of age and extending—according to opportunity or the necessities of his future employment—to sixteen, eighteen, or twenty-one years of age. I am chiefly concerned, as is indicated by the title of this volume, with the education of the intellect, but if I do not mention them further it must not be supposed that I do not assign first-rate importance to physical education and training, including general hygiene, games, dancing, the use of arms, drill, manual dexterity and the use of tools. In agreement with Huxley, I would have drawing made as universal an accomplishment as writing. Nor do I underestimate the prime importance of that drill in cleanliness, truthfulness, and reasonable trust in those loved and respected which belongs largely to the period preceding school life, and together with other moral teaching has to be enlarged and developed and never lost sight of during succeeding years. What, however, I am here concerned with is the education of the intellect during the school period and the subsequent university or college period.

The matters with which such education deals are broadly divisible into two groups, viz. matters of Science and matters of Art. In fact, to quote the words of Huxley, all matters which can be put into propositions and affirmed or denied, and with which, accordingly, the reasoning faculty alone is occupied,

come under the province of "science" and all things feelable, all things which stir our emotions and can neither be proved nor disproved, but only felt and known, come under the province of "art" in the sense of the subject-matter of the æsthetic faculty. It is obviously true that there is a certain overlapping of these two provinces, that a great deal of "science" appeals to the æsthetic faculty, and also that "art" finds its material in the results of science and that its manifestations can be made the subject of scientific analysis. In any educational programme the province of art must have a prominent place, and above all the art of literature. English literature offers a rich field through which the school-boy should be skilfully led, passing in successive years from its simpler to its more complicated appeals, unobscured by pedantic insistence on the dismal fatuities of grammarians. Not only the love of beauty of literary expression but development of the emotional response to ideals of liberty, patriotism, justice and mercy, and to "the story of the noble deeds of great men in the past," [1] are thus, and thus only, to be secured.[2] The acquirement of the natural and free use of the French language, and where time permits of another modern language and possibly of Latin—if the pernicious system of grammar-teaching at present hindering all such acquisitions were

[1] Froude's definition of "history."

[2] Necessarily the space at my disposal and the fact that we are here specially concerned with one great branch of education—namely, that of the intellect—render it impossible to discuss here the all-important influence of education upon the development of moral ideals and its equally important relation to physical training and bodily health. In order to prevent the assumption that I, and those who agree with me in attaching very great importance to education in the natural sciences, ignore or wish to neglect what may be called "moral training," I think it necessary to state emphatically that such an assumption is erroneous. We hold that to act upon

abandoned—should be a regular and easy step in the literary part of education even for those whose school years close at the age of sixteen, and thus the key to endless fields of romantic beauty and high invention—the great heirloom and maker of the human conscience—would be placed in their hands. Nor should time be grudged to the initiation and practice of the scholar, at frequent intervals, in music and a knowledge and appreciation of the beauty of pictorial and decorative art and of architecture and sculpture.

But such æsthetic training must in no way exclude or be more than an accompaniment of the education of the school-boy in the knowledge of those laws or rules of Nature, of the actual world in which he exists, which is called "natural science." The aim of this part of his education is to enable him "to think truly." It begins by showing him that there are such rules or laws; that definite effects follow from definite causes; that all that he sees and knows are but parts of a vast connected network of sequences. It then, at

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the emotions of the young, so as to implant in their minds ideals of self-sacrifice and devotion to duty and to the noblest causes, is the greatest and most delicate task devolving upon those to whom education is entrusted, be they parents or schoolmasters. The methods and results of moral training must never be lost sight of nor abandoned in favour of an exclusively intellectual education. Indeed, we hold, as the judgment reached by purely scientific investigation of the subject, that the moral impulses of emotional origin and character are of such overpowering force in shaping human life and character that they must be developed and directed, from earliest youth onward, with the greatest care. They demand more attention and ripe wisdom for their supervision and guidance than any other educative factor of the ever new and unperverted generations to come. They can be so directed as to bring destruction and death to the nation in which they are trained, or, on the other hand, so as to establish peace and good-will among men, and the joy of unselfish devotion to the development of human well-being.

once, proceeds to show him that *he can himself ascertain and demonstrate*—prove to himself and to others—the existence of many of these laws and their exact operation, not merely in a vague general way, but in reference to and by actual practice of accurate measurement of weight, volume and motion.[1] Further, he learns how —by what methods of inquiry—these details of the working of Nature have been ascertained. He becomes familiar with the scientific method—the chain of observation, hypothesis, and corroborative "trial" or experiment. And so he has already come into possession of "a wisdom" for the lack of which in our legislators, officials and industrial leaders we are now greatly suffering. He may now, at the age of fifteen or thereabouts, mainly specialize in some special course of what is called "vocational education" equipping him for skilled work in profession, manufacture or trade. Or he may go on to deeper study of some one branch of science (not neglecting meanwhile the æsthetic accompaniment), and possibly he may find that he has that rare aptitude which enables him, after a few more years of work as pupil in a master's laboratory or workshop, to become himself a discoverer, to enjoy the delight of being a maker of new knowledge. A third mode of employing the later years of the educational course is open to those whose circumstances enable them to postpone "vocational"

[1] I have not specifically mentioned in this sketch those simple "equipment studies," reading, writing and arithmetic. We may assume that these are duly taught. But it is necessary to state without ambiguity that the student of science must also be equipped with such use of mathematics as are necessary for his purposes and are within the range of his capacity. That equipment must be acquired progressively *as it is needed*. The further study of mathematics as a special and detached subject will be pursued in later years by those who discover in themselves mathematical talent.

training or to dispense with it altogether. They are able to devote these later years mainly to the development and completion of a "philosophy"—using the word as Hamlet does—a philosophy the outlines of which will have shaped themselves in earlier years and must be thought out and completed in such leisure as they can afford, also by those who are not able to give much of their school or college period to it. Science, and especially natural science, will have taught them (I quote the words of Huxley) "the supreme value of veracity of thought and action, and the duty of facing this world as it is when stripped of the garment of make-believe with which pious hands have hidden its uglier features."

As soon as possible some portion of a school-boy's time should be given to the acquirement of a knowledge of what may be called the natural history of the human mind; in later years a more detailed inquiry into its limitations and possibilities—the science called psychology—must be pursued. The early history of man, together with anthropology in its various branches must most surely be included in the later studies of those who have already an adequate acquaintance with the great facts embodied in the sciences of Physics, Chemistry and Biology. So will the educated man build up his philosophy. But whilst so engaged he will do well to exercise himself largely and keep a healthy mind by *doing* as well as thinking, by making, inventing, discovering, and not merely accumulating knowledge. And this habit of "doing" things, of making and taking part in the actual movement of scientific discovery and invention, instead of merely reading or hearing about them and looking on at a distance, should even from quite early years be a leading feature of a boy's education in the various branches of science.

The cultivation of the æsthetic faculty, the knowledge and love of literature, the gift of "thinking truly," the effective preparation for "vocational training," the access to the career of a discoverer of new knowledge and (in a more or less effective measure) the acquirement of a philosophy—a scheme of the relations of man and Nature and of existence itself—these are the aims of school and college education proposed in the brief sketch which I have given above. I have also indicated in outline the subjects by the teaching of which those aims can be realized, provided that false methods are avoided and those methods which I have suggested are pursued by teachers worthy to undertake the splendid task of education. So far as I can judge there are many who will agree with me that the aims which are here suggested as those to be attained by education of the intellect are feasible, and that it is a matter of national duty to take all necessary steps in order to secure to all classes of the community an education with these aims and of this character.

We are, however, met by those who offer us—as something actually superior to what I have sketched—the classical education, the education in fragments of Latin and Greek—the time-honoured, superannuated "classical system." It is, indeed, now reserved for the wealthier classes, but those brought up in it and limited by it have in recent times been permitted to devise and control a more modern official scheme of education, supposed to be suited to the requirements of the less fortunate mass of the people, and necessarily not merely tainted but rendered abortive and ineffective by the methods and prejudices implanted in the officials by their own education in the classical system.

It cannot be maintained that " the classical system " tends to the accomplishment of any of the aims which have been above enumerated as those which we may expect to attain by an education in which literary cultivation by means of English and other modern languages accompanies a thorough and sincere teaching and training in the methods and results and history of " natural science." It does not in any way cultivate literary taste or implant either a knowledge of or liking for literature. On the contrary, it creates in the large majority of its victims a disgust for not only Latin and Greek literature but for all serious literary study. As Lord Rayleigh, the Chancellor of the University of Cambridge, told the meeting at Burlington House on May 3, 1916: " It is nothing less than an absurdity to talk about impressing the average school-boy with the language and literature of the ancients." He quoted his brother-in-law, the distinguished classical scholar, Henry Sidgwick, as saying that " the great impediment to a literary education is classics: you pretend to take a literary education by Greek and you end by getting none at all." When, further, we come to that aim of education which we have spoken of here as " thinking truly," we find that the classical system does not make the smallest pretence of even attempting that result. There is no possibility of its introducing a youth to a perception of the bare facts of the world in which he lives, let alone giving him any understanding of natural laws or a development of his own powers of observation, judgment, and capacity for discovering what is true and what is false. He is put through exercises in the memory and imitation of the phrases of more or less ignorant and deluded Roman and Greek writers. He is trained as the slave of authority and tradition.

His outlook is backward rather than forward, and he is—so far as the classical system educates him at all—led to shrink from facing the great facts which actually concern his very life and his relations to its incidents, and to cover his ignorance and incapacity by quotation or invocation of extinct "masters" of whose writings *his* understanding is as small as is *their* importance at the present day.

When the worthlessness and consequently injurious character of "the classical system" in education are brought to public attention,[1] it has become usual of late years on the part of those who seek to defend that system to make assertions attributing to it virtues and advantages which they are not able to prove, as a matter of fact, to belong to it. The chief of these is the assertion that the classical system gives "literary education." Lovers of literature and adepts in that art have been induced to rally to the support of the "classical system" by this plea. But the evidence before us clearly shows that the classical system is destructive of literary education and its worst enemy. A second plea is that the grammatical and other such exercises of the classical system form an unrivalled "mental gymnastic," and that on this ground we should approve of its monopoly of school education. The reply to this is that there are other equally good "mental gymnastics" available, and that in any case

[1] It is necessary to point out, without any ambiguity, that the conviction that "the classical system" provides only an ineffective and injurious education, and that the writings of Roman and Greek authors would not be suitable for the education of the young even were they more skilfully taught, by no means implies a denial, on the part of those who have that conviction, of the beauty and interest of classical literature, nor any desire to hinder the profound investigation of antiquity by mature students whose tastes and abilities lead them in that direction.—E. R. L.

it is injurious to employ more than a very limited portion of the time and resources of school education in gymnastics, whether physical or mental. A third line which has of late years been taken in the attempt to defend the classical system is to call the study of the classics and of archæology, history, geography and modern languages "humanistic." It is difficult to ascertain what its inventors really meant by this clumsy word, but if it is used in order to suggest a connection with the "humanism" of the Renascence it is grossly misleading; if it is intended to imply that the studies so described are "humanizing," and that others contrasted with them are brutalizing, it is offensive as well as untrue; lastly, if it is intended to assert that the studies classed as "humanistic" are especially "human" or "humane," as relating to man's thought and endeavour, we must protest that we cannot consent to exclude from the application of those terms any branch of human thought and endeavour. As a great thinker and writer, W. K. Clifford, has said, "There are no 'scientific' subjects. The subject of science is the human universe; that is to say, everything that is or has been or may be related to man." The claim that the classical system furnishes an education in "humanistic" studies cannot be admitted (even were we to accept that term), for the reason that the classical system fails altogether to give an education.

Those who desire to see the natural sciences made an integral part of the educational course in all the great schools of this country have especially to beware of the mischievous attempts which have been made in the past, and are likely to be carried further in the future, on the part of devotees of the classical system to set up a teaching of natural science and to model it according to the methods which have proved

to be a failure in the teaching of classics. The dry-and-dead "elements," as they are called, of various natural sciences have been elaborated into books which are to be hammered into boys' heads by machine-like masters ready to undertake to hammer any subject into any boy. Thus natural science is reduced to the level of the Latin grammar and its educational value entirely lost. There is no possible reconciliation between natural science and the classical system. Only when the classical system and its methods and its overgrown staff of "unable" teachers have been swept away can the natural sciences even begin to be properly taught in the great schools.

Some of those who are devoted workers in one or another field of science and believe, as we do, that the natural sciences should hold a leading place in education, consider that to base the advocacy of this revolution on the facts that national success in the struggle for commercial and industrial supremacy and adequate national defence in war depend upon knowledge and skilful use of the discoveries of science, is undesirable. They desire to see knowledge and the discovery of truth pursued for their own sake. They rightly hold that the highest efforts of the human mind in this direction are and must be independent of the incentives and demands of material conflict, whether commercial or military; that science should be pursued for the love of science as art for art's sake; and that only so can science escape misdirection and proceed to higher and more glorious developments. One may, it seems to me, agree with such a view of the ultimate claims and requirements of science and yet hold that when that view has failed to gain attention, and the conditions for progress towards its acceptance are so

remote that the very existence of the spirit, methods and results of science is unknown not merely to the masses but to the highly educated leaders of the commonwealth, it is right to compel attention to the nature and power of science by an appeal to patriotism, the almost universal desire for national prosperity and national defence. The dependence of our national existence on adequate understanding and use of science is not an illusion or a misrepresentation, but a demonstrable fact. The desire for national prosperity and for freedom from domination and enslavement by ruthless, ambitious neighbours bent upon our destruction and their own aggrandizement, both by achieving commercial and industrial superiority and by murderous violence, is not ignoble. Patriotism is, indeed, very generally esteemed as a high virtue, necessary in the present phase of human development, although it may hereafter be replaced by universal philanthropy. Science must stoop to conquer. Its cultivation and diffusion, enforced by patriotic and even purely commercial motives, will ensure respect for and some understanding of its significance throughout the community. Then, and not until then, we may hope for the permanent enthronement of the duty of "thinking truly," as one of the ideals handed on from one generation of men to another—a part of the great heirloom which builds anew in every man his conscience. Soon for very many, as now for only a few, the pursuit of Science will become a part of the Moral Law. It will be felt as an imperative that, in order to do that which is right, man must know that which is true.

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